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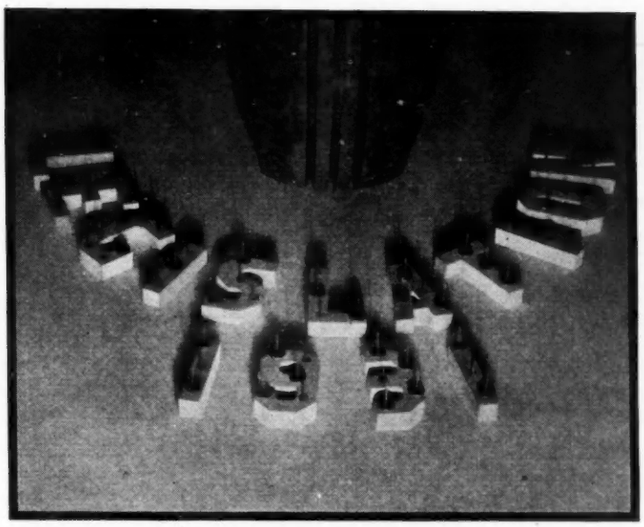
Forty-four States Set Up More Barriers to Motor Vehicle Operation

by A. B. Crofoot



NOT one of the 44 state legislatures which were in session during the first six months of this year failed to pass some sort of legislation for the further regulation of motor vehicles(1). In the social world such unanimity of attention from the great of the land would turn the head of the giddiest debutante. Partisans of the automotive industry, even the most chauvinistic, will admit that this attention is not wholly desirable . . . little drops of sales resistance . . . little grains of friction-producing sand . . . aren't much help in a year like this. In only a few instances were motor vehicle taxes revised downward.

Motives behind the passage of the annual deluge of motor vehicle legislation are mixed. Several stand out with sufficient clarity to remove them from the shadows of theory.

Campaigns directed against motor vehicles by other forms of transportation, alarmist activities of those who have been reading accident statistics, and the feeling on the part of legislators that the automobile is a good source of revenue, may all be named, varying in relative importance according to the local legislative milieu in which they operate.

Perhaps the brightest spot in the situation is the trend toward uniformity on some types of legislation, with the wider adoption of the Uniform Motor Vehicle Code, sponsored by the National Conference on Street and Highway Safety. Aside from this there is no more uniformity in the types of laws passed than there is in the action of a Fourth of July squib. General trends in the legislation may, however, be roughly picked out as follows:

1. There has been an increased tendency toward the regulation of operation over the public highways, particularly regulation of public carriers, both passenger and commercial vehicles.

2. Licensing of operators has been extended to a number of states not formerly requiring it.

3. Restrictions on the size and weight of vehicles using the highways have been altered, in many cases reducing the former limits, and in all cases defining more clearly what type of vehicle may use the roads(2).

4. Gasoline taxes have been increased.

5. Registration fees have been altered, in some cases advanced, in others reduced, and generally more closely classified as to characteristics of the vehicle to be licensed and the use to which it is to be put.

(1) The only state legislatures not in session at some time during the period were those in Kentucky, Mississippi, Louisiana and Georgia.

(2) For a summary of legislation affecting commercial vehicles see *Automotive Industries*, issue of June 6, 1931, Page 863.

6. Reciprocity between the states on motor vehicles regularly operating between two or more states, or engaged in touring, has come in for its share of discussion, but, on the whole, little has been done about it.

7. More states have adopted financial responsibility laws, but compulsory insurance did not make much progress.

8. Equipment inspection has become either compulsory or optional with the motor vehicle commissioner in several additional states.

9. The model code of the National Conference on Street and Highway Safety was argued in a number of states and portions of it were adopted here and there.

On the question of inspection of equipment, we find five states have adopted new laws. Some of these are compulsory, while others merely authorize the commissioner to require this inspection. The states now having inspection laws are Maryland, Pennsylvania, Massachusetts, New Mexico, Delaware, South Dakota, New Hampshire, and New Jersey. Of these states Maryland, Pennsylvania, New Mexico and Massachusetts had inspection laws prior to 1931, but New Mexico passed a new one this year.

Delaware requires that every vehicle must be examined on or before Aug. 1 of each year in order that it may be registered the following year. South Dakota requires that all lighting equipment must be examined and approved by official headlight testing station within six months next prior to application for license or renewal, and provides further that license may be refused if lights are not approved. New Mexico goes much further and calls for the inspection of lights, brakes and steering equipment at least three times a year by a garage or service station designated by the commissioner. New Hampshire and New Jersey authorize the commissioners to require inspection and refuse registration to those vehicles they deem unfit. In New Jersey the inspection is confined to safety equipment, but can be done at designated inspection stations.

New drivers' license laws were adopted in Colorado, Iowa, Kansas and Nevada, requiring that both operators and chauffeurs must be licensed.

Financial responsibility laws, modeled on the bill sponsored by the American Automobile Association, were adopted by Delaware, Indiana, Maryland, Nebraska, North Carolina and South Dakota. New Jersey already had a financial responsibility law, but it was much wider in its scope than the model law referred to. This law was amended this year, eliminating several of the features previously objectionable and bringing it into greater conformity with the model law. Bills were introduced in several of the legislatures calling for compulsory insurance, but none of these was well received, all of them dying before the adjournment of the legislature. Compulsory insurance requirements seem to be definitely on the wane, which is in conformity with the apparent purpose of the American Automobile Association in advancing its typical financial responsibility law as a substitute.

The Three-A model law, it will be recalled, would require that operators' licenses and motor vehicle registrations be suspended or revoked on proof of drunken driving, homicide or assault by means of a motor vehicle, reckless driving, driving without a license, leaving the scene of an accident, operating an unregistered vehicle, or other violations of the usual state motor vehicle code. Such revocation or suspension of the privilege to operate would be effective until such time as the operator or owner of the libelled vehicle should establish his financial competence to pay damages resulting from an accident or violation of the code.

The model law would also require that in case a person is involved in an automobile accident and has resulting therefrom an unsatisfied court judgment, his license be revoked or suspended until he has satisfied that judgment within the limits of financial responsibility established under the code. For this purpose, and that of the foregoing paragraph, the responsibility of the driver or owner is set at $1,000, in the case of property damage resulting from an accident; up to $5,000 in the case of death or injury to one person, and up to $10,000 in the case of more than one person.

Financial responsibility may be established either in the form of an insurance policy issued by a company recognized by the state insurance department; a bond issued by a surety company licensed to operate within the state; or a bond guaranteed by at least two persons owning real estate within the jurisdiction of the authority adopting the code.

At least 11 states have increased their gasoline taxes, one of them, Florida, going up to 7 cents a

(Turn to page 308, please)

Periodic Inspection of Equipment Adopted in Five More States

Delaware—Provides that every vehicle must be examined on or before August 31 each year in order to obtain registration for the following year.

New Hampshire—Authorizes the Commissioner of Motor Vehicles to require the inspection of any vehicle or trailer to determine its condition and permits him to refuse registration of vehicles he believes unfit for use.

New Jersey—Authorizes the Commissioner of Motor Vehicles to designate inspection stations and require the inspection of all safety equipment on all vehicles. Also permits him to revoke or refuse registration for any vehicle he deems unfit for service.

New Mexico—Requires that lights, brakes and steering equipment be examined at least three times each year by a garage or service station designated by the Motor Vehicle Commissioner as an official testing station.

South Dakota—Provides that all lighting equipment must be examined and approved by an official headlight testing station within six months next prior to the presentation of application for license or renewal. License or renewal may be refused if lights are not approved by a testing station.

Registration Fees Have Been Altered

Alabama—Change common carriers passenger fee from fixed charge 1 per cent gross to fixed charge based on capacity and rate per passenger mile.

Change common carriers property carrier fee from above basis to flat fee plus fee per mile operated (mileage fees also based on capacity).

Arizona—Change trailer fee from flat fee of $3.50 plus rate based on capacity to flat fee of $3.50.

Change dealer registration fee from same as classification and $3.00 per set extra plates to $3.50 for one vehicle in each class and $1.00 for extra plates.

Arkansas—New fee of $5.00 for trucks of 750 lb.

Colorado—Change passenger car fee from 5 per cent f.o.b. list price to fee based on manufacturers' net weight.

Add new fee for tractors not exclusively farm.

Raised fee on tractors of more than two tons.

Change fee for private carriers for hire from one based on capacity to one based on mileage.

Florida—Reduced fee for "for hire" vehicles to one based on capacity and mileage only.

Idaho—Clarify passenger car fee wording.

Reduced fee on trailers.

Reduce fee per seat in passenger cars for hire.

Illinois—Increased weight rate for "for hire" property carriers from $1.00 to $1.50 per 100 lb. over regular fee.

Iowa—Has added special fees for truck tractors based on capacity of trailers.

Kansas—Has added administration fee of ½ mill per ton mile (150 lb. per passenger or 200 per cent rated capacity for trucks) to existing fees for "for hire" vehicles.

Maine—Slight reclassification in private commercial car rates.

Classes trailers of over 4000 lb. capacity as trucks.

Minnesota—Added fee for snowmobile of $3.00 for one ton or less plus $2 for each additional ton.

Missouri—Removed exceptions to $10.00 per seat fee on passenger carriers for hire. Former exceptions:

a. Not operating over regular routes, ½.

b. Interstate not more than 10 miles in state, 1/3.

Increased fees for property carriers for hire.

Montana—Added flat fee of $10.00 per vehicle on "for hire" carriers to former fee based on size and weight, but not to exceed $10.00.

Nebraska—Adopted reciprocity.

Nevada—Adopted two new laws seemingly contradictory.

Reduced non-resident privileges from 90 to 5 days.

New Mexico—Private Passenger Cars:

Increased renewal fee from $10.00 to $15.00, but shortened period of non-prior registration from three to one year.

On renewals raised from $1.00 to $1.50 per 100 lb. the fee for net weight over 2400 lb.; former base, 2000 lb.

Reduces fees for successive registrations.

Private Commercial Cars:

Shorten period of non-prior registration for reduced fee from three to two years.

Reduce fee for weights in excess of 2400 lb. from $2.00 to $1.50 per 100 lb.

Increased seat fee for passenger carriers.

Shorten period, as in private commercial, for cabs and U-Drive cars.

North Dakota—Change passenger car fee from one based on value to one based on manufacturers' net weight.

Altered scale of annual reductions.

Adopted fee of $5.00 first ton plus $5.00 per ton additional for trailers when used with "for hire" truck.

Increased fee for "for hire" passenger cars from $5.00 to $7.00 per seat, and maximum payable to R.R. commission from $30.00 to $75.00.

Also increased maximum to R.R. commission as above for "for hire" property carriers plus $25.00 flat fee.

Ohio—Increased all passenger car fees on reclassified horsepower groups.

Reclassified net weight groups in private commercial and raised fee per 100 lb.

Oregon—Change weight groups from net to actual for private (passenger and commercial).

Raised from 500 to 750 lb. exempt weight of trailers.

Pennsylvania—Added a gross receipts tax of eight mills for property carriers "for hire" (where interstate—that portion earned in state).

South Dakota—Reclassified weight groups for passenger cars and raised rates for weights above 3000 lb.

Same for private commercial, raising fees for everything over 1500 lb.

New scale for trailers based on weights results in lower rates under 1250 lb., and higher above that weight.

Flat fees for intramunicipal buses, trucks, trailers and tractors ($75.00) and for vehicles used exclusively for highway maintenance and repair ($150).

Raise seat fee in passenger carriers of more than seven capacity from $2.00 to $8.00.

(Placed 90-day limit on foreign privileges.)

Tennessee—Adopted special tax for vehicles for one county and special gas tax for one county.

Texas—Added flat fee $10.00 for contract haulers to other fees charged.

Vermont—Permit semi-trailer of less than 2000 lb. free registration; above that same as regular. trailer.

Washington—Reduced passenger car fees to flat $3.00, formerly $10.00 for 1500 lb. plus 60 cents per 100 lb. additional.

Same for commercial cars, but adds 50 cents per 100 lb. of load.

Electrics added at 50 cents per 100 lb. gross.

Same for "for hire" passenger carriers, but adds $3.00 per passenger seat.

(Reduced charge for duplicate dealer plates to $3.00 each.)

Wisconsin—Altered additional fee for common carriers from flat $10.00 plus 15 cents per ton mile to scale of fees per ton mile graduated according to weight.

Wyoming—Added ½ mill per passenger mile to passenger common carriers and two mills per ton mile to property common carriers.

Add 50 per cent for solid tires.

Financial Responsibility Laws

During 1931 the Following States Have Enacted Financial Responsibility Laws:

Delaware	Nebraska
Indiana	North Carolina
Maryland	South Dakota

gallon. Two more have passed the five-cent mark, at one time thought the point of diminishing returns and have placed the tax at six cents a gallon, namely Arkansas and North Carolina. The states of Arizona, Maine, Oklahoma and Washington have brought theirs up to the five-cent level, and North Dakota, Utah and Wisconsin have raised theirs to four cents, Massachusetts has raised its tax from two to three cents a gallon.

In the matter of additional taxation, however, the changes of registration fees are more numerous. Comparatively few changes were made in dealers' registration fees. Arizona reduced the price of extra dealer plates from $3.00 per set to $1.00 per set, and Washington reduced the price of additional sets of plates from $10.00 per set to $3.00 each.

Comparatively few changes were made in the field of registration fees for private vehicles, either passenger or commercial. The bulk of the changes were in the "for hire" group, common and contract, and passenger and property. Most of such changes as have been made in the private car registrations fees have been in the nature of greater refinement of classification, and in one or two instances of changing the basis from value to weight. Thus Colorado and North Dakota have changed from a percentage of the base price to a rate per weight as the basis of figuring fees. Washington has reduced its fee from $10.00, with additional amounts for heavier vehicles, to $3.00 for passenger vehicles and to $3.00 plus 50 cents per 100 pounds of *load* for commercial vehicles. Idaho, Maine, New Mexico, and South Dakota have refined their weight groupings considerably with resulting higher fees for heavier vehicles in a number of cases. Ohio refined its horsepower classification with a resulting higher fee for cars with horsepower higher than 28. Oregon changed its basis from net weight to actual weight without further change in the fees. Iowa added a classification for truck tractors, basing the fees on the capacity of the attached semi-trailer. Minnesota added a classification for snowmobiles.

In the field of private trailers, Arizona reduced its rate from the same as trucks to a flat rate of $3.50. Arkansas wrote into its law a new lower rate for lighter trailers, while Colorado increased its rates for heavier trailers. Maine now classes trailers weighing more than 4000 lb. as trucks, while South Dakota which formerly classed all trailers as trucks has classified them separately by weight and given them their own scale of fees, and Vermont now permits semi-trailers weighing less than 2000 lb. free registration. Idaho has reclassified them according to weight and reduced both the number of classifications and the fees for these classifications. North Dakota formerly made no mention of trailers in its law, but now has a scale of fees based on weights. Oregon has raised from 500 to 750 the weight of trailers that are permitted free registration.

An increasing tendency to tax "for hire" vehicles on a mileage basis was evidenced in this year's new legislation. In most cases this took the form of a tax in mills per passenger mile or ton mile, depending on the type of service in which the vehicle is engaged.

Those states requiring the taxation of "for hire" vehicles on the basis of mileage require the owners or operators of the vehicles to keep accurate daily records, and submit these records to the proper authority, either monthly or quarterly, with the amount of the tax due on the basis of the records.

Common carriers in Alabama, Wisconsin and Wyoming are taxed on a ton-mile basis and all of these states with the exception of Wisconsin tax passenger carriers on a passenger-mile basis similarly. In all of these states, with the exception of Kansas and Wyoming, the rate per mile depends on the capacity of the vehicle as well. Colorado taxes non-common carriers on a similar basis, and Florida taxes both common and non-common carriers on a straight mileage basis. Practically all of these taxes are a part of the registration fees, but are additional to other registration charges applicable to vehicles of their type operating privately.

There have also been a number of cases where states have increased the number of classifications by capacity of "for hire" vehicles for registration fee determination.

This year there has been little evidence, as there has in past years, of efforts to divert funds raised from the motorist to uses other than construction and maintenance of highways. In some instances a portion of these funds have been turned over to municipalities to improve their streets which form connecting links of through highways, but inasmuch as this is for the improvement of through thoroughfares, it really comes into the construction and maintenance of highways budget.

Reciprocity of driving privileges between various states came in for considerable discussion this year, but action was taken in only three instances, and in only one of these was there any improvement from the motorists' point of view. Nebraska adopted complete reciprocity this year, while Nevada reduced the period during which licenses from other states will be honored from 90 days to five days, and South Dakota abandoned complete reciprocity for private vehicles to grant reciprocal privileges for 90 days, and further excepted trucks.

The municipal street traffic section of the uniform vehicle code was introduced in Oregon, West Vir-

Drivers' License Laws

New Laws Passed in Following States During 1931 Require Both Operators and Chauffeurs Must Be Licensed:

Colorado	Kansas
Iowa	Nevada

ginia, Colorado, Nebraska and Utah, the complete code being introduced in the last three named states. This section was adopted in Oregon, Utah and West Virginia. The section dealing with drivers' licenses was introduced in 19 states altogether, and was passed in Iowa, Kansas, Nevada, Oregon, Michigan and West Virginia.

In their efforts to curb the destruction of roadways from too heavy traffic and to prevent too great an encroachment into the rights of the private passenger car owner, legislators this year made a concerted assault against excessive weights and sizes of commercial vehicles. New restrictions were adopted covering permissible gross weights and dimensions of single units and trailer trains operating over the highways. While in some instances overall lengths were increased, the tendency was in the opposite direction, reducing permitted lengths from 85 ft. to anywhere from 28 to 45 ft.

It was in the field of weights that the greatest changes came. Here the effort to prevent road destruction took the form not so much of placing maximum gross loads, although these were also employed, but in specifying the distribution of these loads at their points of contact with the road surface. Thus we find frequent mention in the new laws of axle load and wheel load. Frequently allowance is made for the greater distribution obtainable through dual wheels, and the width of the tires is often a governing factor in the load permitted. The protective qualities of pneumatic tires as compared with solid rubber or metal tires also received greater attention this year than it has in the past, although this differentiation has not yet been as widely adopted as it should. Axle spacing is also considered in its function of distributing the load. Thus a vehicle of the six-wheel type cannot have the two rear axles considered as separate in computing the axle load unless they are at least forty inches apart in many states.

De Luxe Publication Marks Sixtieth Anniversary of Loewe

IT has become customary in Germany for large industrial corporations to mark their anniversaries by the issuance of de luxe publications relating to the history of their development in both its commercial and technical phases. Such a work is Die Geschichte der Ludwig Loewe & Co., Aktiengesellschaft (History of the Ludwig Loewe Co.), published by Gesellschaft fuer Elektrische Unternehmungen-Ludwig Loewe & Co., Berlin, which is the present style of the firm. Ordinarily, of course, the twenty-fifth and fiftieth anniversaries are thus commemorated. The Loewe firm failed to celebrate its fiftieth anniversary, which occurred a little over 10 years ago, because conditions in Germany were then too uncertain, and it has made up for this by commemorating its sixtieth anniversary.

Ludwig Loewe & Co. has had an interesting and rather turbulent history. Organized in 1870 for the manufacture of sewing machines, it later became an important concern in the small arms industry, and still later in the machine tool industry. To Americans it is of particular interest that throughout its entire history the firm always seems to have looked to the United States for inspiration. Immediately after its organization in 1870, its founder, Ludwig Loewe, came to this country to study American practice in the manufacture of sewing machines in large numbers on the interchangeable plan, and the Loewe plant was laid out and equipped to work on the same plan. Most of the machine tools required had to be imported from the United States, and the high cost of these tools, due to the high wages paid here and the burden of ocean freight and duty on them, led the company shortly after to enter upon the manufacture of machine tools itself.

Toward the end of the century, when American machine tools had found a wide market in Germany, it was decided to completely reorganize the works in accordance with the latest American plans, and to that end three American engineers were engaged. In 1903, when F. W. Taylor published his work on "Shop Management," its principles were at once tried out in the Loewe works. Again in 1924, during the severe depression following the collapse of the German currency, the general manager of the firm, accompanied by an engineer, made a trip to this country, as a result of which a patent license was secured for the manufacture of an automatic boring machine, and the firm brought out a number of new tools within a few years.

Rather interesting were some of the experiences of the firm during the period of inflation. This at first led to a complete reversal of the usual relation between seller and buyer. There was no difficulty at all in selling all you could make, but what required the greatest care was to so formulate the conditions of payment that the price should still be worth the product when you finally received it. Under these conditions the terms of sale had to be made constantly more rigid, and this finally led to a slackening in the demand.

During this year of inflation (1923) great difficulties were experienced also with labor, and numerous long-drawn-out wage conferences were held. When a strike occurred in the government printing office, the firm (as the first in Germany), was forced to print its own private emergency currency, which was readily accepted by merchants. It was soon after redeemed by the company. Although wages were paid at shorter and shorter intervals, the quantities of paper money required for the purpose were so large that the safes were too small by far to hold it. Bales of currency were stacked up in the cashier's office and a guard was on duty day and night.

This anniversary volume is in two sections. The first of these, dealing with the general history of the firm, was written by Dr. Conrad Matschoos, general manager of the German Society of Engineers, who has specialized in the history of German industry; the second part, relating more to technical phases of the firm's work, was written by Prof. Georg Schlesinger, a German authority on machine tools, who was connected with the Loewe company from 1897 till 1904.

British Aero Laboratory Supplements Relation of Spark Plug Location

Series of tests made with a Ricardo engine having four spark plug positions and equipped with double pole switch for quick changeover

IT has been known for some time that in order to make an engine as free from detonation tendencies as possible, the spark plug should be so located that the flame travels through the combustion chamber from the hottest to the coolest portion. This has been confirmed, and considerable additional light has been shed on the effect of spark-plug location and of engine speed on detonation or the tendency to detonate, by a series of tests made in the (British) Air Ministry Laboratory, which are discussed in an article in *Engineering* (London) of August 7, by R. O. King and H. Moss.

The tests were made on a Ricardo E-35 variable compression engine. This engine, of which drawings are shown in Figs. 1 and 2, is provided with two large inlet valves on one side and three smaller exhaust valves on the opposite side. There are four spark plug positions, and the ignition system is arranged to ignite the charge at any two plugs, the change-over from one pair of plugs to another being made by a double-pole switch S in the high-tension circuit. This arrangement made it possible to compare the audibility of detonation with one set of plugs to that with another before the effect could be influenced by changes in engine condition. To assure synchronization of the two sparks, a single primary circuit was used, together with two secondary coils of equal electrical characteristics, each connected to one of the plugs. By the highest useful compression ratio (H.U.C.R.) as determined in these tests is meant the compression ratio at which slight audible detonation occurs under full throttle, with a jacket-water temperature of 140 deg. Fahr., the mixture strength being such as to give maximum detonation.

It was found that the H.U.C.R. for any fuel depends somewhat on the fuels previously used in the engine. For instance, for a gasoline-benzol mixture it will be higher before a doped gasoline has been used in the engine than after. Similarly, the H.U.C.R. for a gum-free fuel will be higher before a gumming fuel has been used than afterwards. The deposits on the spark plugs after a doped fuel has been used in the engine are especially effective in reducing the H.U.C.R. usually obtained for a benzol mixture, and careful cleaning does not eradicate the effect. The Laboratory therefore makes it a practice to have a special set of spark plugs for use with ethyl gasoline, and to clean them whenever the concentration of the ethyl fluid is changed greatly. A second pair of plugs is kept for use with undoped fuels only.

The fuels used in the tests under discussion included a gasoline A, a commercial grade containing paraffins, naphthenes and aromatics in the approximate proportion by weight of 57, 35 and 8; gasoline B, a straight-run Borneo distillate containing naphthenes and aromatics in sufficient proportion to enable it to be used with a compression ratio of 5.0 at 900 r.p.m. as compared with a H.U.C.R. of 4.45 for gasoline A under the same conditions.

Commercial benzol and pure cyclohexane were used as representing, respectively, the aromatics and naphthenes occurring in natural fuels. The paraffin used, boiling range 122 deg. to 300 deg., was aromatic free, and contained about 5 per cent of naphthenes. A lighter paraffin, comprising fractions boiling under 104 deg. was also used. The ethyl fluid contained lead tetra ethyl and ethylene dibromide in the usual proportion of 3 to 2 by volume.

In previous work with the Ricardo E-35 engine ignition had been effected by using two oppositely located plugs, which had been found just as effective as the use of all four plugs. In the present investigation one series of tests was run to compare the

Table I.

Effect of Direction of Flame Movement on Detonation. Ignition Timing, 30 deg. advance. Air Supply Unheated.

Fuels used. (a) Gasoline A + Benzol (b) Gasoline A + Ethyl Fluid.	H.U.C.R. plugs 1 and 2. Flame moving toward inlet valves. Engine Speed. 900 r.p.m.	1500 r.p.m.	Decrease of H.U.C.R. on reversal of flame movement. Engine Speed. 900 r.p.m.	1500 r.p.m.
(a)—				
Gasoline A alone	4.55	5.45	0.23	0.30
2 Gasoline A, 1 Benzol	5.35	6.35	0.27	0.35
1 Gasoline A, 1 Benzol	6.10	7.00	0.27	0.43
(b)—				
Gasoline A alone	4.55	5.45	0.23	0.30
Gasoline A + 4 cc. per gallon	5.35	6.50	0.30	0.32
Gasoline A + 6 cc. per gallon	5.70	6.90	0.31	0.32
Gasoline A + 10 cc. per gallon	6.20	7.35	0.24	0.33

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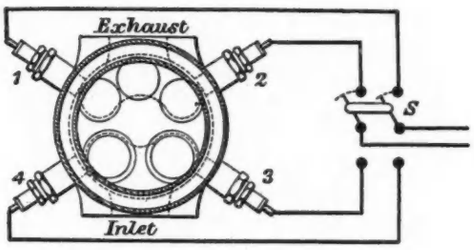
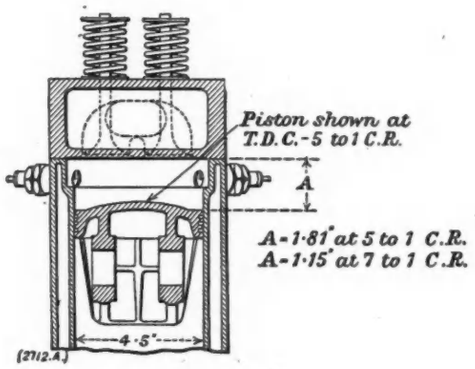




Figs. 1 and 2 (Left)—Engine combustion space, showing positions of valves and spark plugs + + + + + + +

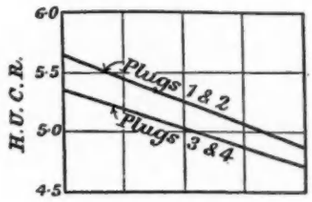


Fig. 3

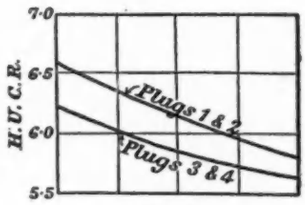
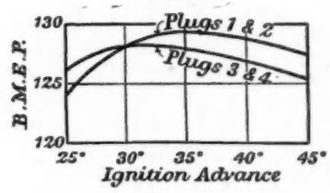
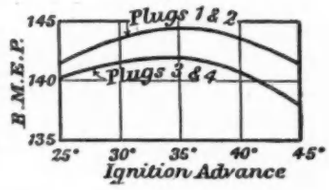


Fig. 4





Figs. 3 and 4 (Above)—Effect of direction of flame travel on H.U.C.R. and B.M.E.P. for different spark advances of which—

(Fig. 3, Left pair)—Was obtained with gasoline with an inlet temperature of 43 deg. Fahr + + + + + + + +

(Fig. 4, Right pair)—Was obtained with a 2:1 blend of gasoline A and benzol, with an inlet temperature of 39 deg +

In both cases the engine speed was 1500 r.p.m. + + +

Plugs 1 and 2, flame movement toward inlet valves + +

Plugs 3 and 4, flame movement toward exhaust valves +

effectiveness of plug positions 1 and 3 with that of 1 and 2. Experiments were made successively with gasoline A, with this gasoline improved by the addition of benzol in the proportion of 1 part to 2, and with this fuel improved by the addition of 4 cc. of ethyl fluid per gallon. The engine was run at 1500 r.p.m., with the air supply unheated, and observations were made of the H.U.C.R. and the B.M.E.P. for the ignition-timing range of 25-45 deg. advance. The following conclusions were drawn from the results obtained:

(a) Nearly the same values of H.U.C.R. are obtained with both directions of flame movement, whichever fuel is used, particularly when the ignition timing is set for maximum power, i.e., about 35 deg. advance.

(b) The power developed (B.M.E.P.) with gasoline A alone is clearly greater, at any ignition timing up to 45 deg. advance, when the charge is ignited at opposite sides (plugs 1 and 3) than when plugs 1 and 2 are used and the flame movement is toward the inlet valves. When benzol or ethyl fluid is added to gasoline A to increase the usable compression ratio (and incidentally the B.M.E.P. by about 15 lb.), greater power is again obtained when plugs 1 and 3 are used, but at retarded ignition only, and with the higher values of the H.U.C.R. accompanying the retardation. For both fuels, the B.M.E.P. curves intersect at approximately the ignition timing required for maximum power, and if the ignition is further advanced, maximum power is obtained when using plugs 1 and 2.

(c) Generally, the preliminary experiments justify the original choice of spark-plug positions (1 and 3), for performance trials of the E. 35 engine when

Table II.

Effect of Direction of Flame Movement on Detonation. Ignition Timing, 30 deg. advance. Induction Temperature, 122 deg. Fahr.

Fuels used. (a) Gasoline A + Benzol (b) Gasoline A + Ethyl Fluid	H.U.C.R. plugs 1 and 2. Flame moving toward inlet valves. Engine Speed. 900 r.p.m.	1500 r.p.m.	Decrease of H.U.C.R. on reversal of flame movement. Engine Speed. 900 r.p.m.	1500 r.p.m.
(a)—				
Gasoline A alone	4.40	4.90	0.04	0.26
2 Gasoline A, 1 Benzol	5.00	5.35	0.08	0.40
1 Gasoline A, 1 Benzol	5.35	5.65	0.21	0.43
1 Gasoline A, 2 Benzol	6.05	6.35	0.35	0.59
(b)—				
Gasoline A alone	4.40	4.90	0.04	0.26
Gasoline A + 4 cc. per gallon	5.20	5.70	0.07	0.40
Gasoline A + 10 cc. per gallon	5.70	6.15	0.16	0.35
Gasoline A + 20 cc. per gallon	6.20	6.65	0.21	0.41

straight-run fuels or those containing usual additions of benzol or ethyl fluid are used.

When ignition was effected by spark plugs 3 and 4 the distance of flame movement and the shape of the space into which the flame traveled were the same as before, and any differences in H.U.C.R. and B.M.E.P. were therefore due to differences in the conditions on the exhaust as compared with the inlet side. The changes in H.U.C.R. and B.M.E.P. consequent upon the reversal of direction of flame travel was found to depend on the nature of the fuel used, the temperature of the air supply, the ignition timing and the engine speed. Hence the effects of reversal of flame travel were investigated under different conditions.

In a first series of tests the ignition was set at 30 deg. advance and the engine was run at 900, 1200 and 1500 r.p.m. successively, and with fuels of different anti-knock values. In some of the tests the air was drawn into the engine unheated, while in the remainder it was preheated to 122 deg. Fahr. In this series the H.U.C.R. invariably decreased while the flame travel was reversed so it was in the direction toward the exhaust valves. The results are given in Tables 1 and 2. It will be noticed that the effect of reversal of flame travel was always greater at the higher engine speed. A rather remarkable result was that with gasoline A alone, with unheated air, the H.U.C.R. was raised by 0.90 when the speed was increased from 900 to 1500 r.p.m. When ethyl fluid was used to delay detonation, increase of engine speed had a measurably greater beneficial effect on the H.U.C.R. than when an equivalent addition of benzol was used. The beneficial effect of an increase in engine speed diminished as the air supply was heated.

Some additional tests were made with special fuels, one being a 3:2 paraffin-benzol mixture, another a gasoline B, a third a 2:1 cyclohexane-paraffin mixture and the fourth, cyclohexane alone. The naphthene content of these four fuels were 0, 30, 66 and 100 per cent respectively, while the paraffin contents were 60, 38, 33 and 0 per cent respectively. With the 100 per cent naphthene there was a decrease of 0.11 in the H.U.C.R. when the direction of flame travel was reversed at 1500 r.p.m.; with the blend containing 66 per cent of naphthene there was no change in the H.U.C.R. under the same conditions, while with the other two fuels there was a gain (0.19 with the paraffin-benzol mixture and 0.09 with gasoline B).

Effect of High Inlet Temperature

The experimental results obtained for the relation between temperature and detonation are of interest in connection with the operation of supercharged engines. The induction temperature with a moderate degree of supercharge may easily reach 122 deg. Fahr., when the usable compression ratio will depend on the direction of flame movement and the nature of the fuel to a much greater extent than at normal induction temperature. It is common practice to improve the anti-knock value of a fuel by the replacement of part of the paraffin content by aromatics and/or naphthenes, but a fuel so improved, when used at the induction temperature of supercharged engines, tends to lose the beneficial effect on anti-knock value of high engine speed. The entire beneficial effect may be lost if flame movement is toward the exhaust valves. On the other hand, when the anti-knock value of a paraffinic fuel is improved by the addition of ethyl fluid, the beneficial effect of increased speed is enhanced at normal induction temperature and is little, if any, less than that for the undoped fuel at 122 deg. induction temperature, even when the flame travel is toward the exhaust valves.

In another series of tests the effect of flame-movement reversal and ignition timing on the H.U.C.R. and the B.M.E.P. was investigated. It was observed in the tests, with the ignition set at 30 deg. advance, that although the H.U.C.R. might be as much as half a ratio higher when the flame travel was toward the inlet than when it was toward the exhaust valves, a corresponding improvement in the B.M.E.P. was not obtained. The experiments were therefore extended to determine the relationship between the three relevant factors of B.M.E.P., H.U.C.R. and direction of flame travel. Three fuels were used, namely, gasoline A, a 2:1 mixture of gasoline A and benzol, and gasoline A with 4 cc. of ethyl fluid added per gallon. The engine was run at 1500 r.p.m., and the air was first unheated and then heated to 122 deg. Fahr.

Results from these tests include the following:

The increase of compression ratio usable with retardation of ignition when ignition is already late, is accompanied by a decrease instead of an increase in power. On the other hand, when ignition is more advanced, the decrease of compression ratio consequent on a further advance is followed by the expected decrease in power.

Required Ignition Advance

If ignition timing is fixed, the power obtained when flame movement is toward the intake valves is appreciably greater than when it is toward the exhaust valves, provided the compression ratio is adjusted always to give just audible detonation.

The increase of power accompanying the increase of compression ratio was less than that obtained in similar circumstances with a fixed direction of flame movement, except when the ignition advance was large.

It is necessary to use less ignition advance when the flame travel is toward the exhaust valve than when it is toward the inlet valve. The experiments support the view that combustion is more rapid when it is toward the hot exhaust valve side than in the opposite case.

It would be expected therefore that on raising the overall temperature of combustion, less ignition advance would be required for maximum power. The contrary effect is obtained at 122 deg. Fahr. air temperature, since the values of the B.M.E.P. reach a maximum when the ignition advance is from 5 to 10 deg. greater than when the inlet air is unheated.

With heated intake air, however, the usable compression ratio is necessarily lower than with normal induction; also, the proportion of exhaust gas in the combustible mixture at the end of the induction stroke is greater than with cold intake air, and a reduction is obtained in the speed of combustion which is greater than the increase due to temperature rise.

In a further series of tests the compression ratio was maintained constant, the variables being the direction of flame travel and ignition advance.

When the inlet air is unheated, and at any ignition timing, changing the direction of flame travel from toward the inlet to toward the exhaust valves is equivalent to advancing the ignition 3.5 deg.

The same maximum power is obtained irrespective of the direction of flame movement, but at about 3.5

(Turn to page 324, please)

JUST AMONG OURSELVES

Shunts the Slow Drivers

OUT on the Dunes Highway near Indianapolis a minimum speed law of 40 m.p.h. on Sundays has been in effect for a month.

Since that time, newspaper reports quoting Chief of State Police Grover says, "No automobile has been damaged and no driver has been injured." This despite the fact that numerous accidents did take place on week-ends shortly prior to the installation of this law. Now, if any driver traveling in a lane of Sunday traffic moves at less than 40 m.p.h., he is shunted to a near side road by the state police.

Our only comment on this whole report is, "Hurray!"

Business Now Is On Sound Basis

SUCH automobile business as is being done these days and such as will be done during the last four months of this year rests on the soundest possible basis.

Few people are buying cars today unless they are practically certain that they will be able to pay for them. There is much less tendency to gamble on the future than there was in boom times. Consequently, a greater proportion of cars sold today are staying sold.

Couple this condition with relatively low new car stocks in the hands of most dealers, and we have a situation which will quickly show the effects of any stimulation in buying. Both retailers and buyers are operating closer to a bed-rock basis than ever was thought of when business was good. Repossessions of used as well as of new cars are less in proportion to total sales now than they were a year ago for several big finance company units. Our guess is that this situation has been brought about by more conservatism on the part of both the buyers and sellers.

The Purpose of Business is Profit

MORE than one automotive company has apparently forgotten that simple truth.

To argue that the purpose of business is service is but to state the same truth in slightly different words, for without service it is now generally recognized there can be no permanent profit.

Nor is the remembrance of that truth at variance with current efforts to provide as widespread employment as possible. Only the shallow thinker will argue that employment can be provided without profit to management. Assuming that America is not going to go Russian, it is fairly obvious that profit for the individual concern is the base upon which rest the chances of that firm's providing employment for workers.

The purpose of business is profit—in 1931 as well as any other time.

The Social Responsibility of Our Industries

THERE will be much talk this winter about unemployment insurance, doles—local and national—stabilization of employment and such matters. Much theory will be discussed, and some practical things will be done. In the time available, it is inconceivable that any permanent, basic program can be developed and put into operation in time to alleviate materially the difficulties of the winter 1931-32. It is probable that the main usefulness of the Gifford or other unemployment relief bodies will be that of coordinating and rendering more effective all those agencies for relief now existing, and setting up additional temporary facilities for meeting the emergency.

Behind all this, however, lies the more basic problem of the social responsibility of industry to the individual worker. Our chief business leaders have recognized that responsibility for more than a decade; the heads of thousands of small businesses are gradually coming to recognize it.

But recognition is only the first step. From recognition to the outlining and putting into operation of any effective system of stabilization is a road which it will take many years to travel. And the danger is that, having met the temporary emergency as we will undoubtedly do this winter, the fundamental problem will be sidetracked indefinitely with the return of good business. And yet a permanent program can be established and gotten into working order only when economic pressure against it is light.

Bonding Companies Say We Are Honest

THE records of bonding companies, we understand, prove clearly that an overwhelming percentage of people are honest. Finance company experience with repossessions seems to bear this out.

A very high percentage of all repossessions, we were told the other day, is made within the first month or two or three after the car has been purchased. Were there any high degree of purposeful dishonesty among car buyers this would not be the case, since early repossession—when repossession has to be made—favors the dealer rather than the customer.—N.G.S.

Continuous Nitriding Process Will Hardness by Varying the Heat Cycle

An arrangement of successive temperature zones that may be easily controlled makes it possible to obtain different types of cases at will + + +

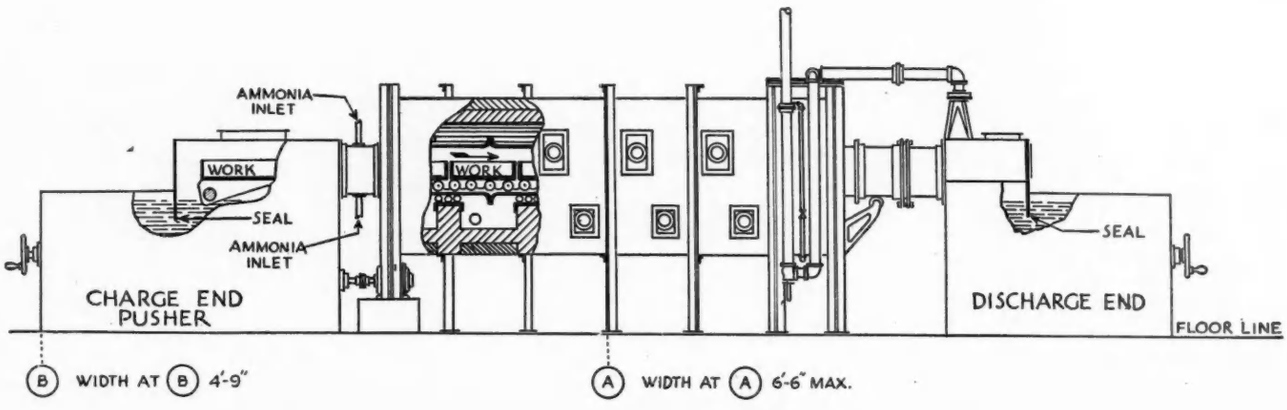
THE accepted nitriding process has been of the intermittent or batch type. Separate lots of metal in a special container are treated with ammonia gas for the required time, and the whole process cycle is completed before another lot is started. The commercial development has followed along the same line, and the furnaces largely used for this work today are modifications of that ordinarily used in the batch-type process.

The batch method has characteristics that make for production difficulties, and the cost tends to limit its field. Continuous nitriding overcomes these two paramount difficulties in a large measure.

The continuous process is now commercially available, since two continuous furnaces have been built by the Surface Combustion Corporation. The important feature of this process is that the nitriding itself is continuous, for the metal surface under treatment is being continuously exposed to ammonia of the degree of dissociation suited to the temperature of the work. Ammonia samples taken at different points along the muffle have indicated a progressive degree of dissociation toward the outlet end. This progressive dissociation remains constant during the entire cycle. It is apparent that this is a matter of greatest importance.

The operation of the batch type and that of the continuous process are fundamentally different from the standpoint of the ammonia dissociation desirable in the outlet gases. By the intermittent or batch-type process, it is necessary to maintain an ammonia dissociation of approximately 35 per cent at the outlet to obtain proper nitriding. The reason for this is that hydrogen as well as nitrogen is liberated by ammonia dissociation, and a concentration of hydrogen much greater than that represented by 35 per cent dissociation has a strong decarburizing action on the metal being treated.

Excessive decarburization precludes the best nitriding results. In order to get the best results by this type of process, the reacting gases must be thoroughly agitated in order to sweep away from reacting surfaces any high concentration of hydrogen with its harmful effect. The problem of agitation is not so much that of bringing ammonia into contact with the work as it is of keeping hydrogen away from new metal surfaces. Because of this serious defect in the process, it is necessary to effect a compromise between hydrogen concentration and ammonia dissociation whereby a certain degree of dissociation is found that will work satisfactorily. Unfortunately this compromise means



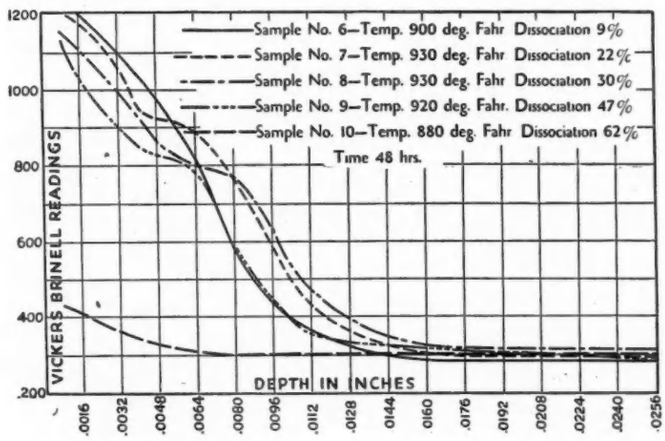
Surface Combustion Corporation's continuous nitriding furnace

Produce Any Degree of Penetration or

by R. J. Cowan
Metallurgist, Surface Combustion Corp.

Chart 1—Different Dissociation

Effects of different degrees of dissociation



a loss of 60 to 70 per cent of the nitriding medium, which adds appreciably to the cost of the operation. Unfortunately, also, this means that full strength ammonia is never in contact with new metal surfaces.

In the continuous process, ammonia enters the reaction chamber along with the work and travels in the same direction as the work during the entire operation. By this means, the new metal surfaces can come into contact only with full strength ammonia, which exerts its full nitriding power on the metal at a time when it is most susceptible to its action, and without any retardation from excessive hydrogen decarburization. For this reason it is not necessary to agitate the gas to prevent decarburization. The flow through the muffle can be regulated so as to produce an ammonia dissociation at the outlet of any desired degree. Since the process furnishes an automatic protection from the action of excessive hydrogen, it is possible to maintain a dissociation at the outlet of 85 to 90 per cent ammonia and produce excellent nitriding. This is made possible by the fact that the concentration of hydrogen caused by such a procedure cannot come into contact with new metal surfaces due to the direction of gas flow. Experiment has shown that the subsequent action of hydrogen on a nitrided surface will not injure that surface. Hydrogen is objectionable only when it reacts with new metal surfaces by decarburizing. It will be seen, therefore, that by the continuous method it will be possible to bring full strength ammonia directly to the metal surface being treated and to use all the ammonia admitted to the system without danger of decarburization. The development of this process will now be taken up in detail.

In chart No. 1 are shown the results obtained by having different degrees of dissociation of the ammonia maintained constant throughout the test. These tests were run in a five tube laboratory furnace in which the outlet gas for one tube was used as the inlet gas for the next tube. By this means it was possible to secure different degrees of dissociation in each tube. These varied from 9 per cent in the first tube to 62 per cent in the last. The time at temperature was 48 hours. The results confirm the usual practice of using a low dissociation for batch-type operation. It is evident that when the dissociation is much over 50 per cent the results are not satisfactory.

Chart No. 2 presents in convincing form the results obtained by conducting the nitriding under conditions of variable dissociation. In these cases the dissociation was changed continuously throughout the run, in one case varying from high to low and in the other from low to high. Two temperatures were used, viz., 1150 deg. Fahr. and 950 deg. Fahr. It is a significant fact that in each case where the dissociation varied from low to high during the test, the results were much better than when the high to low conditions prevailed.

This chart is of particular importance in considering the direction of gas flow best suited for continuous nitriding. If the ammonia is introduced into the muffle so as to run counter to the incoming work, the ammonia dissociation as it comes in contact with the work will vary from high to low. That is to say, the

Chart 2—Variable Dissociation

Depths and hardnesses of case obtained with variable dissociation

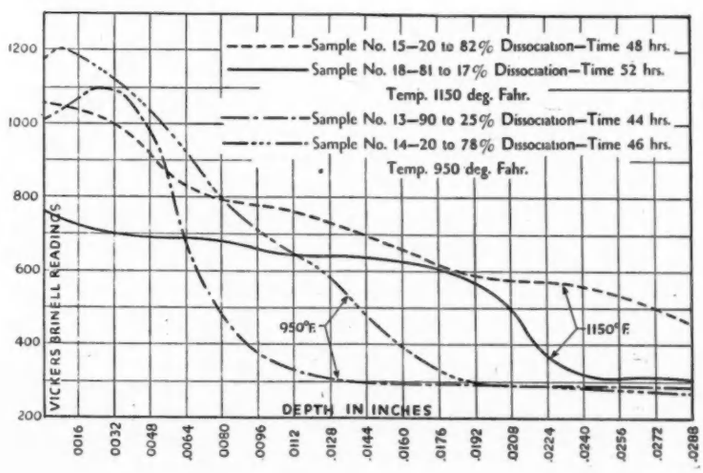
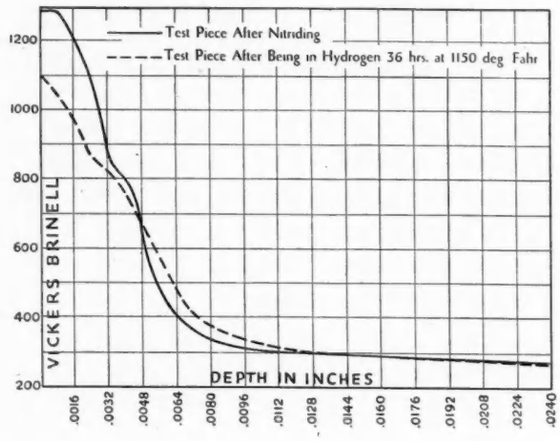


Chart 3—Effect of Hydrogen

Effect of hydrogen on case hardness



surfaces to be nitrided will be first acted upon by the most highly dissociated gases and later by the more powerful nitriding gas. It is well to point out that the highly dissociated ammonia is made up of considerable hydrogen whose decarburizing power is notorious. Many investigators have called attention to poor nitriding results from excessive decarburization. Our results confirm their findings in pointing out the danger of inferior work when highly dissociated gases react with new metal surfaces. The evidence is very convincing that the ammonia must move in the same direction through the muffle as the advancing work, that is, the dissociation must vary from low to high. This will bring the rich nitriding gas into direct contact with new metal and avoid any danger from excessive decarburization. For this reason we have adopted in our continuous process, as an essential part of the process, the flowing of ammonia gas parallel with the work. It is believed that if in the work recorded on this chart we had carried the dissociations to still lower values, the cases would have been still better (as shown by Chart No. 5).

Mention has been made of the fact that the subsequent action of hydrogen on a nitrided surface is not objectionable. This is shown in detail in Chart No. 3. In this case a test specimen that had been nitrided was exposed to the action of hydrogen at a temperature of 1150 deg. Fahr. for 36 hours. The slight softening of this piece as shown by the curves is no greater than if the piece had been heated for the same length of time in a neutral atmosphere. This points to the fact that a surface which has been nitrided is protected from subsequent decarburizing by the hydrogen from highly dissociated ammonia gas.

Chart No. 4, presents the results of some work with different heat cycles. We adopted two temperatures, 1150 deg. Fahr. and 950 deg. Fahr. for this study. The curves show what is possible by the batch-type process where a constant ammonia dissociation of 30 per cent is maintained with different heating cycles, one where the higher temperature reactions are given first and one where the low. This chart is included for comparative purposes. It indicates what we were able to do by the batch-type process with constant dissociation and short heating cycles.

Chart No. 5 presents the results obtained from the first attempt to nitride continuously in a commercial manner. This work was done in our laboratory in a small size unit, for a customer who needed some results in a hurry. The ammonia dissociation at the outlet of the muffle was 90 per cent and the total time 16 hours. The single curve is an average of a number of tests all about alike. A duplex cycle was used for this work, consisting of 8 hours at 950 deg. Fahr. and 8 hours at 1150 deg. Fahr.

It is interesting to compare these results with those represented by Chart No. 4, where a 10 hour treatment with a constant ammonia dissociation of 30 per cent gave very poor results. Comparison can also be made with Chart No. 1, in which are given the results from a series of tests with different dissociations. In this chart the uniform dissociation of the batch type extended over a period of 48 hours. The results with continuous nitriding (Chart No. 5) for 16 hours with an ammonia dissociation at the outlet of 90 per cent is superior to that obtained by any constant dissociation (Chart No. 1) maintained for 48 hours. This is strong proof that the process is scientifically sound.

The next question that naturally arises is as to

Chart 4—Heat Cycles

Effects of different heat cycles

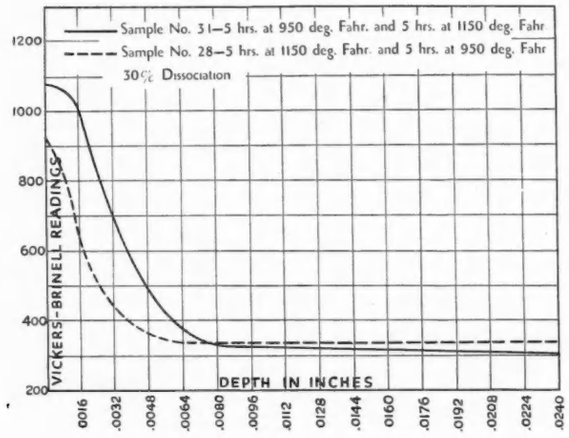
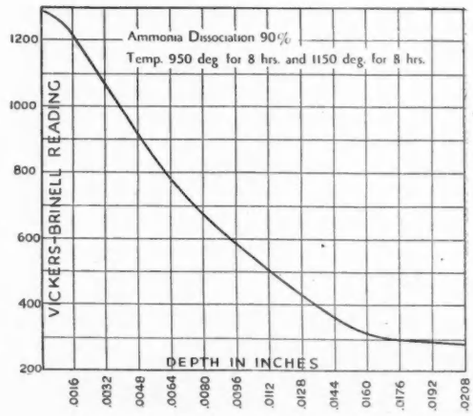


Chart 5—Continuous Nitriding

Hardness and depth of case obtained with continuous nitriding

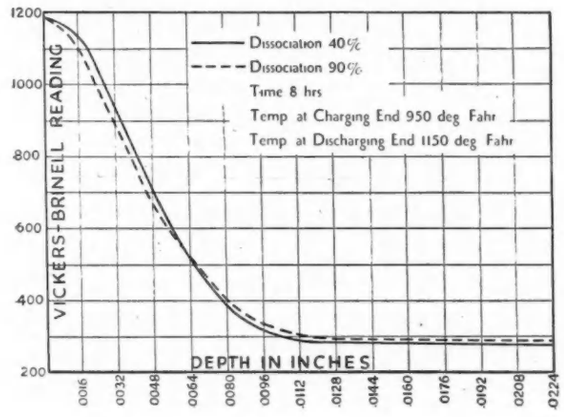


how much better results might be obtained if, in the continuous process, we were to maintain a lower dissociation at the outlet—say, 40 per cent rather than 90 per cent. To investigate this matter, some work was done using the same heat cycle for each test but changing the dissociation. These results are shown on Chart No. 6. These curves are so nearly alike as to be almost indistinguishable. The work was repeated at higher temperature with similar results. This points to a conclusion of great practical value. It shows that a low ammonia dissociation maintained at the outlet has no merit in the process for continuous nitriding. In other words, the ammonia may be used completely in this process without danger of impairing the work. Such practice is absolutely impossible by any other method as is shown by reference again to Chart No. 1, where a 62 per cent dissociation in a batch-type process gave very poor results.

After deciding on the degree of dissociation desirable for continuous nitriding, a study was made of different heat cycles to determine which one would give best results by this process. It would seem that a gradual increase in temperature from the inlet to the maximum

Chart 6—Continuous Nitriding

Effect of dissociation with continuous nitriding

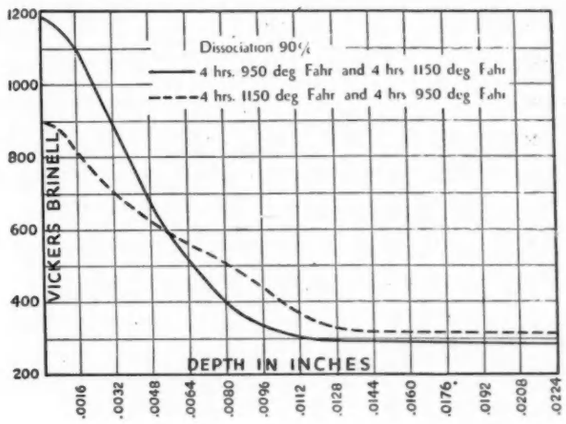


temperature desired would be more in harmony with progressive dissociation of ammonia and the continuous nitriding reaction than the reverse condition where high temperature at the inlet is followed by a low temperature zone. In this latter there would be a very rapid ammonia dissociation at the inlet, which would no doubt be too rapid for complete nitrogen absorption by the metal and the slowing action on ammonia dissociation of subsequent decreasing temperature would not assist in further nitriding, so that the final complete dissociation at the outlet would not means as good a nitrided case. In Chart No. 7 are shown the results obtained. In one case the high-temperature treatment was given first, in the other the low temperature. A dissociation of 90 per cent was maintained at the outlet in both cases. From this series it is evident that the low-to-high temperature produces best results when used for continuous nitriding.

The character of case desired determines the arrangement of heat zones for this process. In this regard the method is particularly flexible. A very hard case may be produced by lengthening the low temperature zone, with the consequent shortening of

Chart 7—Continuous Nitriding

Effects of heat cycles with continuous nitriding



the high temperature zone; whereas a tough case with greater penetration may be produced by placing the high temperature zone first and the low temperature zone last in the cycle. By varying these zones, both as to their order and relative length, it will be possible to obtain any particular result that may be desired. It is believed that the continuous nitriding system is alone in possessing these features and that by these means many of the present erratic results may be completely obviated. One looks forward with much interest to subsequent development along these lines, for by these means the metallurgist is now given a control over the process heretofore unapproached.

We may summarize these results as follows:

(A) The batch-type process cannot produce satisfactory work with an ammonia dissociation greater than 50 per cent.

(B) This is due to high hydrogen concentration which causes excessive decarburization.

(C) High hydrogen concentration does not affect a previously nitrided surface; therefore, if nitriding is conducted so as to bring only fresh ammonia into contact with new metal surfaces, the danger of high hydrogen is eliminated. (By new metal surfaces is meant those intended for nitriding.)

(D) This can be done only by continuous nitriding where the ammonia moves along the muffle in the same direction as the work. This fact forms the basis of the continuous process.

(E) By this means it is possible to use fully all of the ammonia admitted to the system. A dissociation at the outlet of 90 per cent is good practice.

(F) An arrangement of successive temperature zones that may be easily controlled, makes it possible to obtain different types of cases at will.

(G) A considerable saving of time is effected by this process, work done in 16 hours comparing favorably with that done in 48 hours by usual methods.

(H) The consumption of ammonia is very much reduced, with the consequent saving in this item of cost.

To carry out this process, Surface Combustion has developed two furnaces, one of which is shown in general outline in the accompanying sketch. This consists of a metal muffle continuous throughout the furnace, fired from both sides by gas burners arranged so as to be under accurate pyrometric control. By this

means definite temperature zones can be maintained as desired. The ends of the muffle are encased in a metal hood, and the work to be nitrided is brought into the muffle on a tray through a liquid seal. A pusher arm operating on the inside of the seal moves the work progressively through the furnace. A similar arrangement at the discharge end takes care of removing the work. The trays are carried above the floor of the muffle so that ammonia may be admitted both above and below the trays and forced through the muffle in the same direction as the work. A suitable discharge is arranged for exhaust gases.

A second furnace, not shown in detail, consists of an alloy pan conveyor type arranged to operate continuously through suitable seals. Either type of equipment may be used for this work.

As nitriding is practiced at present, two different types of heat cycles are being used for intermittent nitriding. A low temperature cycle of about 900 deg. Fahr. and a high temperature cycle of about 1150 deg. Fahr. are used either separately or in different combinations to produce certain results. Sometimes, the low temperature treatment is given first, followed by the other, and at other times the sequence is reversed.

Generally speaking, the low temperature treatment produces maximum hardness, the high temperature treatment maximum penetration. The low-to-high cycle seems to be designed to produce first of all at low temperatures a case of maximum hardness which is caused to diffuse and penetrate by a subsequent hold at high temperature. The high-to-low cycle aims to produce maximum penetration at first, with subsequent diffusion under conditions of low temperature and maximum hardness. The continuous process for nitriding may be used with any heating cycle desired.

In the continuous process the work to be nitrided is placed in shallow trays or baskets which, by a suitable mechanical device, are admitted to a metal muffle through a seal. The muffle is heated from the outside by a series of gas burners arranged so as to be under automatic temperature control. The work is pushed progressively through the muffle into the successive heat zones arranged as desired, and discharged through a similar seal at the outlet.

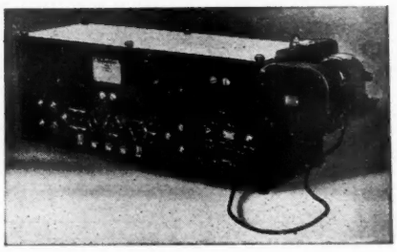
Flight at High Altitudes

THE interesting subject of flight at high altitudes, and particularly that of the thermodynamic principles of engines for same, forms the basis of a thesis by Dr.-Ing. Asmus Hansen (Thermodynamische-Rechnungsgrundlagen der Verbrennungskraft-maschinen und ihre Anwendung auf den Hoehenflugmotor, published by VDI Verlag, Berlin NW-7). The investigation covers altitudes up to 30 km. (18.75 miles). For two-stroke engines a new charging process, referred to as low-pressure scavenging, is proposed. Up to mean critical altitudes (10-15 km.) the specific fuel consumption decreases by from 15 to 20 per cent, while the specific weight of the engine remains about the same. For higher altitudes both values increase together. With increasing altitude the thermodynamic results become more dependent upon the efficiencies of the accessories, but this dependency is less in the case of the two-stroke oil engine than in that of the four-stroke gasoline engine. Long-distance flights at high altitudes can be accomplished only with utilization of exhaust-gas energy. The best means to this end in the case of the speeds of flight which may be expected within a reasonable time is the exhaust turbine. For the operation of such turbines the free-exhaust method is preferred. In the case of free exhaust the turbine must form a unit with the engine, and its development therefore leads to a different form in the case of the two-stroke than in that of the four-stroke engine. "Besides, since the two-stroke oil engine offers the most favorable conditions for the operation of the exhaust-gas turbine, it is advisable to develop the turbine in connection with this engine type," says Dr. Hansen.

New Automatic Oscillograph

FOR use in recording fluctuations of electric power or mechanical changes translatable into electrical ones, the Type PA automatic power oscillograph has been developed by the Westinghouse Electric & Manufacturing Co., Newark, N. J.

The oscillograph consists essentially of four different kinds of galvanometers, each of which is designed for recording certain types of phenomena; two low-energy incandescent lamps, from which light strikes the mirrors on the moving elements of the galvanometers; a moving photographic film upon which the light reflected from the mirrors makes a record of the fluctuations actuating the galvanometers, and a motor geared to the film holder and providing the motion of the film. A 6-volt battery operates the oscillograph, supplying power for both the lamps and the motor.



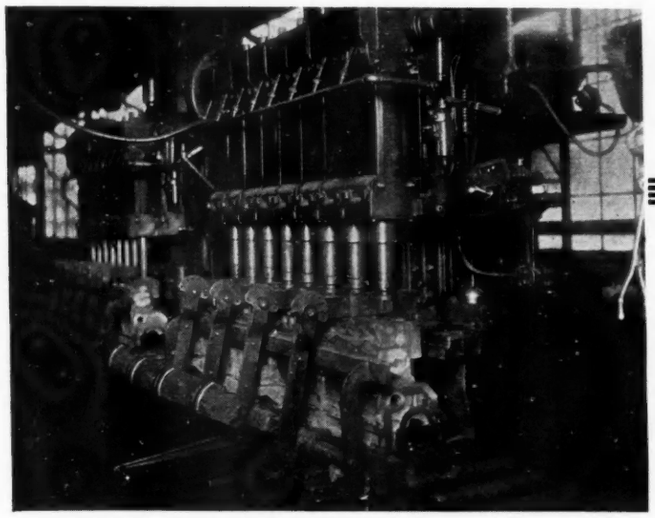
Type PA automatic power oscillograph

In automotive work oscillographs are used particularly to record rapidly varying currents, such as ignition currents, starter currents, etc., or rapidly varying pressures, such as that in the engine cylinder.

The PA oscillograph is protected by an oblong Micarta case, on the sides of which are mounted panel boards providing control for the operation of the device. By means of different panel combinations, the oscillograph is adjusted to record voltage, current, instantaneous and average value polyphase and single-phase watts, positive and negative-phase sequence current and voltage, and phase angles.

On one end of the case the complete film unit, including the motor, is mounted. The film holder takes a film 5 in. in width and up to 10 ft. in length. The motor drives the film through gearing, providing speeds of 4.5 and 9 ft. per sec.

The oscillograph automatically starts to operate within ½ to 1 cycle of a 60-cycle wave after the appearance of a fault.



PRODUCTION LINES

Production Lines of the Industry No. 4

Looking at one section of the cylinder block line in the plant of the Lycoming Manufacturing Co. Part of a battery of husky hydraulically operated machines for rough, semi-finish, and finish of cylinder bores. The spindles are exceptionally heavy, to eliminate the necessity of piloting, as shown in first machine, and simplify the fixture to merely a clamping device

Tipped Tools

Carboloy-tipped drills, forming tools, and special tools are important members of the Ex-Cell-O line. Complete details of these as well as their general purpose Carboloy-tipped tools appear in Catalog C-231. Published by the Ex-Cell-O Aircraft & Tool Corp., Detroit.

Do You Know That—

In 1929 the machine tool industry produced $3,000,000,000 worth of equipment? Of this, the gigantic automotive industry accounted for $1,200,000 worth, which is something well worth shouting about. The figures are from *The Heald Herald*, a publication of the Heald Machine Co., for July, 1931.

Promising Economies

An interesting point about the cost of jigs and fixtures is raised by one of friends in a large manufacturing plant. He says that orthodox methods of design will not lower costs to any appreciable extent. The solution appears to lie in greater standardization of details. And the use of welded construction. Welding technique is advancing so rapidly that we may look forward with some assurance to a decided impetus in that direction. Won't you give us your suggestions?

Appearance Counts

Are line and color in machine tools important? This was asked by one of our readers in discussing the possibility of lowering the cost of equipment by scrapping certain refinements. The answer is clearly written in the technical literature of the past year. Both color and line have exerted a powerful psychological influence on the output and on the operator as well. Color is here to stay. Right now experimenters are working out color schemes to promote better visibility, cleanliness, cheerfulness, and the other things that promote better production.

Old Turnings

James Nasmyth, one of the more famous of the old tool builders, who invented the steam hammer, had become a skilled model maker by the time he was 17. He built up quite a business in brass steam engine models for which he charged £10 each. The castings for his models were made in what the Victorians (often mistakenly) called "the privacy of his chamber." Nasmyth rigged up a foundry in his bedroom fireplace, which, without having tried it, we would call quite a trick. The "auld mon" wasn't in favor of such goings on, however, and Jamie had to carefully conceal the results of his nocturnal puttering. By some miracle, as Roe remarks, "he managed to complete his practical education without burning down the house."

Compressor Lubrication

One correspondent tells us that many compressor troubles are due to inferior or improper lubricant. Also too much of it. To improve performance, use the proper grade. And feed it just enough.

Danly on the Organ

Danly Guide Post is the title of a monthly magazine published by Danly Machine Specialties, Inc., Chicago, manufacturers of die sets and die makers' supplies. The first issue of this house organ, which has just appeared, contains a number of interesting articles for designers, draftsmen and die builders. One article explains how five punch holders are used with one die holder, so saving considerable expense for die sets and dies. Another article deals with the use of die sets as assembly fixtures. Copies of future issues will be sent without charge to those asking for them.

International Cooperation

ASA Bulletin, July, 1931, published by the American Standards Association, features a report by John Gaillard concerning a proposal to set up an international system of fits. The ASA proposal on fits was recently submitted to national standardizing bodies for consideration. Those interested in this important question are urged to read the provisions of this proposal. The ASA will welcome your comments.

Inside Stuff

Our store of knowledge concerning metal cutting has been enhanced by the publication of new data by the Sun Oil Co. "Cutting and Grinding Facts" is a valuable little handbook with which many readers probably are familiar. The second edition just off the press contains the results of a recent survey giving figures of interest to automotive production executives. It will pay you to recheck your practice with these tried recommendations.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

The Forum

An Actual Sinking Fund Should Care for Equipment Replacement

Editor, AUTOMOTIVE INDUSTRIES:

In the July 18 issue of *Automotive Industries* there appeared an article on selection and replacement of equipment by Joseph Geschelin. There are three points in the determination of equipment replacement which were merely touched upon. They are:

1. An actual sinking fund should replace the theoretical fund for the amortization of equipment.
2. The training of engineers and research men to control obsolescence.
3. The tying up of sales forecasting through production control to estimated productivity of considered equipment purchases.

The first is the principle of establishing an actual sinking fund for depreciating equipment. Often we have set the economic life of a machine at 10 years to find after as much as 20 years of service there is not actually enough cash on hand to purchase a much-needed replacement machine. Here is where accountants have a severe challenge to answer. The majority of manufacturers are not expert accountants, but this they do know: if a machine is supposed to pay for itself in ten years, at the end of that period funds for new equipment should be at hand.

A record should be kept of each piece of equipment whereon can be found the actual figures of how quickly the machine is paying for itself. It is putting the burden of proof where it belongs and five excellent machines will not be carrying three unproductive ones.

Second: Obsolescence has too often been a matter of guesswork. In the future, I believe, personal judgment will be aided by more and more facts. Inventive genii are becoming more and more scarce. Men lying abed nights do not happen upon new processes as they once did.

Industrial research and planned engineering development are fast reaching the point at which they can definitely predict when changes will take place before they can accurately predict what those changes will be. Years ago the axiom, "Necessity is the mother of invention," was true. Then obsolescence came overnight. As a result we can look ahead and say, "There will be a change in this particular process in four years." Immediately we call the economic life of this machine four years and ask ourselves the question, "Will it or won't it pay for itself?" Obsolescence is fast becoming a controllable item.

The third point is the tying up of sales forecasting and equipment amortization. Forecasting at last has become a definitely accepted production gage. In a great many industries this forecast has become startlingly accurate. Production can be gaged so accurately that we can look ahead and predict the production rate of any given piece of equipment for at least a year in advance.

Before purchasing a consequential machine, we first go to the sales forecast for the coming year and we gage exactly what the productivity of the machine will be.

Secondly, we call in the engineering staff and the research men and have them draw the "dead line" on obsolescence. It is a simple matter of accounting to determine whether a standard or single purpose machine will be most economical, once the economic life of the machine has been set. We can then deduct the resale, salvage, or scrap value of the machine after it will have been used.

Finally, having installed the new equipment an industrial record of the machine should be kept to see that it lives up to predictions—and an actual sinking fund should be established for the equipment's replacement. These are the major fundamentals of modern equipment control.

RALPH H. SHAW,
Russell Mfg. Co.

War Department is Not in Competition With Industry

Editor, AUTOMOTIVE INDUSTRIES:

In the August 8th issue of *Automotive Industries* I notice an article by Mr. Norman Damon, in which the following statement appears at the bottom of page 17:

> "The War Department has already expended most of the half million dollars of its 1932 appropriation, which was available on passage of the bill. The purchase of new parts for assembly at Camp Holabird may indicate a departure from the policy of purchase of complete new vehicles. This point is of particular interest in connection with the proposed motorization program involving the expenditure of $2,000,000 per year for seven years."

I hasten to write to correct the erroneous impression which may arise as a result of this statement, as it is not the intention of the War Department to depart from the policy of purchasing its complete vehicles from the industry.

As you probably are aware, the War Department appropriation bill for the fiscal year 1932 placed a limitation upon the number and unit cost of motor trucks authorized to be purchased by the department. The prices received in response to the invitations for bids sent to the industry exceeded the amount which the law permitted the War Department to expend; consequently, by reason of the great need of the Army for motor vehicles to replace its worn-out, obsolete equipment without delay, it was decided to procure the necessary parts, units and assemblies from the automotive industry and then assemble the completed vehicles at the Holabird Motor Transport Depot.

Had this action not been taken not only would the War Department have been delayed in obtaining essential equipment until next December, when Congress could be made acquainted with the facts and asked to increase the legal limits and the appropriation for the procurement of these vehicles, but no business whatever would have been given to the industry until after that time.

The War Department acted very promptly in this matter as soon as it was determined that, if we were to get this equipment into the hands of troops at the earliest possible date and also assist business, the only procedure possible was to purchase the parts and make the assemblies at the Holabird Motor Transport Depot, as stated above.

The War Department had no in-

tention of entering into competition with the industry in the production of motor vehicles for the Army. The policy of the War Department is to make the maximum use of standard commercial articles of automotive manufacture to meet military requirements in motor vehicles, to procure completed vehicles from the industry to meet its peace time needs, and to so prepare specifications for motor vehicles that in time of peace as well as war we can assure our position in this respect.

J. L. DEWITT,
Major General,
The Quartermaster General.

A Machine Tool Replacement Fund Should Be Built Proportionate to Sales

Editor, AUTOMOTIVE INDUSTRIES:

Having just finished reading Mr. Geschelin's article on Intelligent Planning in Buying of Machine Tools* and being deeply interested in the success of any project that advances thought along these lines, we are passing along some ideas we gave salesmen of our various representatives.

In the course of time, all machinery becomes worn out or obsolete and should be replaced. Ordinarily, the purchase of new equipment, whether for expansion or replacement, must await the appropriation of funds for the purpose. It is an important function of a replacement policy to provide such funds for a definite amount of replacement within a definite period. In some instances a replacement fund is provided for in the budget. A simple, more scientific procedure is outlined below. (It is equivalent to putting machinery on the pay roll—wear it out a nickel's worth; put a nickel in the kitty.)

The usual "Reserve for Depreciation" is merely a bookkeeping fiction, showing the amount to be deducted from the asset which is depreciated, to reflect its true worth. It covers credit presumably given the plant account for wear and tear on equipment, and is used for cutting down taxes; in most cases, it is not a reserve at all, and has no relation to a replacement policy.

Capital committed to the plant and referred to as "fixed" is not fixed unless maintained at the stated value in one way or another, although in present accounting procedure the term "fixed" is understood as meaning "not liquid," and is not necessarily misleading. However, a simple way exists for stabilizing "fixed assets" at a stated value, namely by building up a cash fund, under the title "Replacement Fund," to offset the current impairment caused by depreciation and obsolescence. Furthermore, such procedure would not conflict with existing accounting principles. Even if equipment doesn't operate, time which means obsolescence runs against it and impairs its value, notwithstanding the fact that you don't depreciate it through wear. These charges when recovered should be returned to the plant in order to perpetuate the business and maintain the value of fixed assets as stated in the balance sheet.

If plant output is charged with depreciation on equipment used in its production, why not restore to the plant the collections made on account of such charges? For illustration—suppose the output of a plant in the course of a year has a net sales value 50 times as great as a proper charge for depreciation and obsolescence amounts to within the year. Then these charges equal 2 per cent of net sales. Whatever may be the actual percentage, it would be a simple procedure to currently place such percentage of all receipts from sales into a "Replacement Fund," and doing so would not disturb any element of the accounting mechanism.

To start operating under such a plan, deposits could start at any time that a decision may be reached to do so, without disturbing the books of account otherwise, and within the period required to completely write off new equipment a "Replacement Fund" would be built up equal to the "Reserve for Depreciation." A sound position would be reflected and everyone and everything related thereto would be benefited. A replacement policy without a "Replacement Fund" as outlined may be quite practical and satisfactory, but is not likely to be quite so liberal and can bring benefits to the plant which adopts it (incidentally stabilizing machine tool buying) only to the extent of its sufficiency for the purpose it is intended to serve.

CHAS D. OSTERLEIN.

* Page 80, *Automotive Industries,* July 18.

Injection and Combustion in Heavy-Oil Engines

Editor, AUTOMOTIVE INDUSTRIES:

Referring to the article on Injection and Combustion in Heavy-Oil Engines, by Messrs. Davies and Giffen in *The Automobile Engineer* for June, the chief problem in connection with variable-speed, high-speed Diesel engines centers around ignition lag. The rest is just a problem of mechanical design which can be standardized as soon as the solution to the former is found.

According to various authorities, the ignition lag is dependent upon thermal, mechanical and chemical conditions in the combustion chamber and in the oil. The temperature and density of the air and whirling of the air, aside from the chemical conditions, are said to determine the ignition lag. The first two factors are determined by the compression ratio, while the temperature can be increased also by a hot plate, as in the Krupp engine.

Whirling of the air, which is a rather vague expression, probably comes into the picture by causing the air and fuel to meet at a very high relative speed. "The chemical condition of the fuel oil, the ability to form unstable peroxides while under the influence of high temperature, high air density and high air speed" leave the mechanical engineer cold; he has to depend upon the oil man to settle problems in connection with these factors.

Enough heat can be provided in oil engines to reduce the ignition lag to such a point that the engine will run smoothly even with the most slowly igniting fuel oils; but it is open to question whether the same engine can burn smoothly a more rapidly igniting fuel oil. I mean by this without making any changes in the engine and particularly if the engine has a speed range of 300-2000 r.p.m.

It is well known that a higher compression ratio produces a smoother engine. The same general principle that is utilized successfully in large, slow-running engines burning tar oils can be applied in small high-speed engines to assure smoother operation with bad oils.

In order to obtain a highly flexible engine it is necessary that the ignition lag be shortened in proportion as the speed increases; in other words, in a variable-speed engine the ignition lag should occupy the same number of crankshaft degrees at all engine speeds. There would then be little need for adjustment of the injection timing. The writer can testify that such conditions have been approached in this country. When these conditions obtain, the heavier oils burn better than the lighter ones. The fuel can be injected over a greater number of crankshaft degrees, thus reducing the maximum pressure, and at the same time an early rise of the combustion-pressure curve can be assured.

HUGO MOREN.

"HOW'S BUSINESS" for SEPTEMBER?

As forecasted by the scores of editors of UNITED BUSINESS PUBLISHERS, Inc.

SOME improvement now seems assured for early September. Industrial plants which have either closed down or greatly curtailed their activities, should be in the market again by Labor Day. Consumer goods, both demand and operations, continue to lead other lines; and the requirements of several million school children who will be returning to school in the second and third weeks of next month should be definitely registered in several retail lines. How much more than seasonal the improvements will be it is hard to forecast.

This much is evident, each day brings us closer to an extended era of replacement. Despite the fact that a considerable volume of consumer goods has been flowing through the stores, and with supplies and surpluses still in evidence in some lines, we are approaching a time when replacement of many more of our goods must be made to meet continued needs.

Activity in woolens would seem to assure that the "wearing out the two pair of pants," which is often given as the duration of a depression, has been accomplished; and replenishing of wardrobes on a more extensive scale is now in progress. A number of months ago a man prominent in the shoe industry remarked, "Faced with going barefoot, the public will shortly have to increase its purchases of shoes." Current increased activity in this field seems assured on into the Fall. From these primary needs for clothing, we shall soon find that, through constant wear and tear, many of our other goods need replenishing.

The urge for new goods is even now being stimulated by actual need, and fortunate will be the firms that have kept up their contacts with customers and consumers, for it means better times ahead for them.

BUSINESS	SALES	STOCKS	COLLECTIONS	COMMENTS
AUTOMOTIVE	Passenger cars about 19% less, trucks 9% less than August, and about 9% and 14½% less respectively than Sept., 1930.	Slightly higher than August in both lines and decidedly below Sept., 1930.	About the same as August, passenger cars much improved, trucks slightly improved from Sept., 1930.	Passenger car sales estimated at 165,000 for September, truck sales 29,000 units.
DEPARTMENT STORES	Up from 15% to 18% (less than normal) from August, and off 10% from Sept., 1930.	About 15% heavier than August, but off 12% from Sept., 1930.	No change in collections.	New merchandise needed to stimulate real buying interest, in contrast to present bargain buying interest.
HARDWARE	About 5% greater than August. Volume equal to Sept., 1930, but dollar value off 10% to 15%.	Approximately 5% heavier than August and about the same as Sept., 1930.	About the same as August but not quite as satisfactory as Sept., 1930.	Fall merchandise should be moving in fair volume in September.
INSURANCE	Better in fire and casualty, lower in life than August. Casualty even or better, fire lower, and life off 8% from Sept., 1930.	.....	Better in all lines and some improvement over Sept., 1930.	Renewed activity looked for in all casualty lines, with good renewals in fire.
JEWELRY	Improvement anticipated over August, and same or slightly better than Sept., 1930.	Slightly higher in September, but generally lower than Sept., 1930.	Slight improvement over August, and about the same as Sept., 1930.	Conservative buying for Fall trade will begin in September.
MACHINERY METAL PRODUCTS METALS	Steel should register some slight improvement in September. Non-ferrous markets, outside of lead and zinc, still depressed.	.....	.....	Present price situation in steel industry better stabilized than at any time in year and a half.
READY-TO-WEAR	September, beginning a new season, will show marked increase over August, and better values will show improvement over Sept., 1930.	Larger than August, and while in many cases lower than Sept., 1930, higher mark ups will increase profits.	Careful selection of risks will show improvement over August and Sept., 1930.	Buyers extremely cautious. Will generally adopt policy of smaller volume and higher mark up.
SHOES	Fall styles will bring marked increase sales over August, and should show some improvement over Sept., 1930.	Stocks will be slightly higher with additions of new merchandise, but distinctly below Sept., 1930.	No change.	Replacement, both by merchants and customers, promises a fairly active September.

New Gabriel Hydraulic Shock Absorber is a Two-Way Device

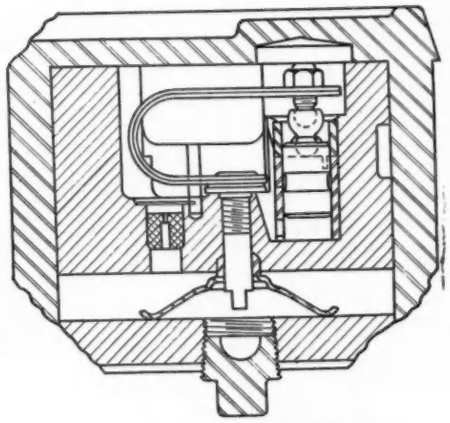
A NEW hydraulic shock absorber in which compensation for atmospheric temperature variations is made automatically by a thermostat has been announced by the Gabriel Co. of Cleveland, Ohio. It is a two-way device, damping the action of the springs both on the compression and the rebound, and it is made in three sizes for cars up to 3000, between 3000 and 4000, and above 4000 lb. respectively.

The body of the shock absorber, which houses all of the working parts, is a steel drop forging and is provided with ears for securing it to the car frame. A bearing in which the lower end of the vane shaft rotates is provided in the center of the working chamber. The complete interior of the working chamber is smoothly machined, to provide an accurate fit for the vane and bearing plate assembly.

The malleable-iron bearing plate, segment and reserve chamber form a single assembly which also includes the thermostatic control and adjusting screw mechanism. This complete assembly is securely pressed into the body and remains stationary while the vane rocks within the body. The reserve chamber or reservoir incorporated in this assembly contains a reserve supply of oil or fluid for replenishing the supply in the working chamber when that becomes necessary.

The thermostatic control device consists of a piece of U-shaped thermostatic metal, to one end of which the adjusting screw is secured, which permits of adjusting "for ride." The other end is fastened to a universal joint, which in turn is fastened to a valve or piston. The thermostatic metal moves the valve or piston, thereby changing the size of the orifice in accordance with changes in atmospheric temperature.

The vane is made integral with its shaft, of drop-forged steel. After the vane with its shaft has been placed in position in the body and the bearing-plate assembly has been pressed in place, the latter is securely locked in position by a malleable lock ring.



Sectional views of the new Gabriel hydraulic shock absorber + +

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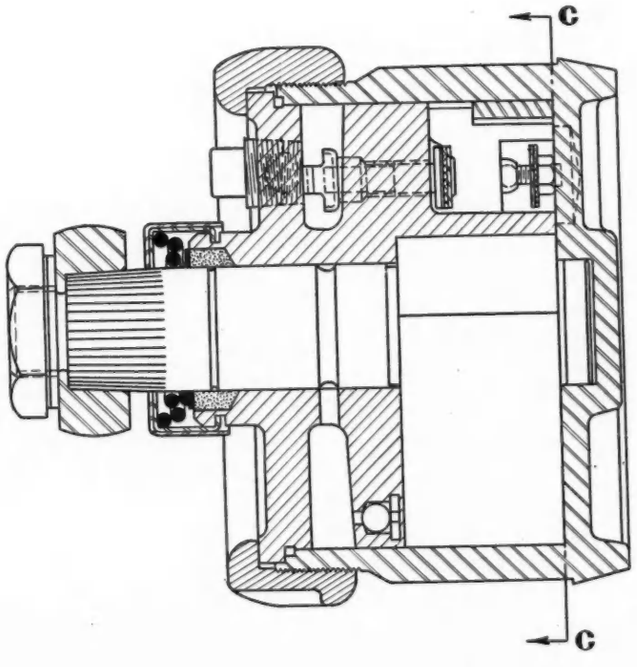

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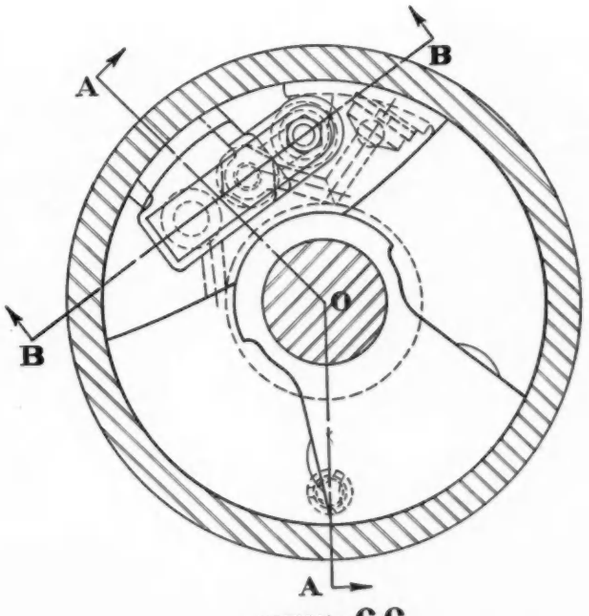

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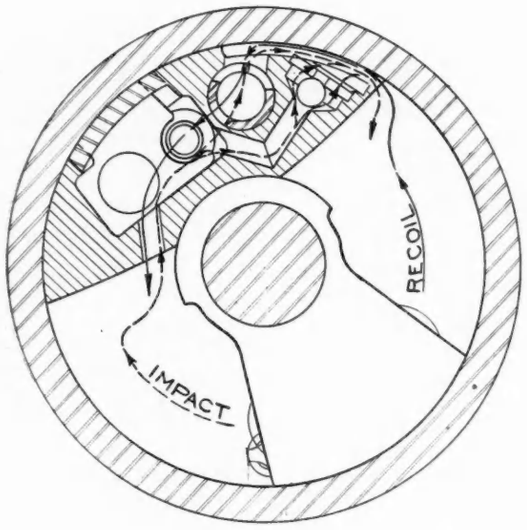


(Left) — Diagram showing direction of flow of fluid under recoil and impact + + +

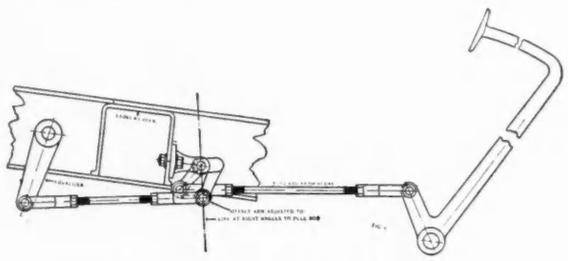
The new hydraulic shock absorber of the Gabriel Co. is made in three sizes + + + + + +

To seal the shock absorber against leakage around the vane shaft, a gasket or packing of composition is placed in a tapered seat in the bearing plate where the vane shaft protrudes. A spring and retainer hold this packing washer under tension in the tapered seat provided, pressing the washer tightly around the vane shaft. A ball check valve is incorporated in the bearing plate between the reservoir or low pressure chamber and the working chamber, so as to keep the main or high pressure chamber full of oil at all times.

The new Gabriel hydraulic shock absorber is a two-way shock absorber. The resistance to the compression movement of the chassis springs is determined by an orifice of suitable size which permits sufficient oil or fluid to pass through it so that it does not interfere with the normal action of the springs, yet provides a resistance when a sharp blow or bump is experienced.

Duplex Brake Mechanism Provides Variable Leverage

A NEW brake linkage which changes the mechanical advantage while the brake is being applied, taking up the clearance rapidly and then increasing the leverage so that a greater pressure can be exerted on the braking surface for a given pedal pressure, has been placed on the market by the Duplex Brake Engineering Co., Inc., 54 Garfield Ave., Trenton, N. J. The essential part of the device consists of a two-armed lever, the two arms making an angle of perhaps 30 deg. with each other. It is incorporated in the link from the brake pedal to the equalizer and the cross shaft. The various links are so proportioned as to length that when the motion of brake application begins the arm which is connected by a link to the brake pedal is at a considerable angle to the link. This makes the effective length of that arm short, and the motion of the double-armed lever around its fulcrum is therefore rapid. When the motion is about half-way completed



Duplex mechanical brake booster

both of the arms make equal angles with the link to the brake pedal and the motion is therefore transmitted through the double-armed lever without change. When the brake is completely applied the arm which connects to the pedal is substantially at right angles to its link, so that its effective length is a maximum, while the other arm, from which connection is made to the cross shaft, is at a considerable angle. For this position of the double-armed lever a given motion of the pedal produces the least motion of the cross shaft and of the brake cam, so that a given pressure on the pedal produces the maximum pressure of the brake.

British Aero Laboratory Develops Data

(Continued from page 312)

deg. more advanced ignition when flame travel is toward the inlet valves than when it is reversed.

The conclusion derived from the final series of experiments is that when ignition timing is adjusted for maximum power, the same output is obtained whether the flame movement is toward the exhaust or the inlet valves. It appears that the advantage of one direction over the other rests on the comparative ability of valves and spark plugs to withstand overheating. Thus, spark plugs placed at the exhaust-valve side of the combustion space tend to overheat in extreme conditions, and if placed at the inlet-valve side the consequent completion of combustion at the opposite side tends to raise the exhaust-valve temperature excessively. The difficulties mentioned are reduced by placing the spark plugs at opposite ends of a diameter midway between the exhaust and inlet valves. Flame travel is then toward the middle, the time required for combustion is reduced because of the shorter average length of flame travel, and a favorable effect on power obtained.

Difficulties of Welding Manganese Steel Are Overcome With New Alloy

A WELDING alloy suitable for welding manganese steel has been invented by Frank A. Fahrenwald, and the patent issued to him on it (U. S. patent No. 1,815,464) has been assigned by him to the American Manganese Steel Company of Chicago. The welding material is said to exhibit the essential characteristics of manganese steel and without heat treatment to have about the same toughness and resistance to abrasion as heat-treated manganese steel.

The term manganese steel covers alloys whose components fall within the following limits:

Manganese	10	to	14	per cent
Carbon	1	to	1.4	per cent
Silicon	.30	to	.60	per cent
Phosphorus	.06	to	.08	per cent
Sulphur	.06	to	.08	per cent
Iron	Balance to make		100	per cent

The value of manganese steel is due primarily to its very great toughness and resistance to abrasion, but these qualities are ordinarily developed only as a result of heat treatment. If a casting of any composition falling within the above-named limits be cooled slowly, it becomes so brittle and weak as to have little value, but if cooled so quickly as to prevent internal transformation it exhibits a very high degree of toughness and wear resistance. It retains these qualities until it is again heated above the transformation temperature, which is somewhere between 700 and 800 deg. Fahr.

Value of Manganese Steel Due to its Toughness

This peculiarity has rendered it impossible heretofore to weld broken castings together successfully. If common steel is used for the weld metal the added material is deficient in strength, wear resistance, and corrosion resistance; if manganese steel welding rod of the usual composition is used the result is even worse in most respects, since the slow cooling due to the shielded position such a weld ordinarily occupies enables a complete transformation of the internal structure and causes it to become so brittle that it often breaks from cooling strains alone, and always if subjected to loads or shocks. Furthermore, if an attempt is made to weld manganese steel castings with manganese steel rod of the same composition, the high temperature employed and the difficulties encountered generally cause the adjacent parts to become overheated and so lose their virtue. Also, the plain manganese steel welding rod is extremely hard to manage, due to the oxidizability of manganese, which necessitates careful and thorough fluxing and exact regulation of the torch; if a reducing flame is used, carbon is absorbed, and the weld becomes fatally brittle; if an oxidizing flame is used the metal bubbles and swells and becomes intermixed with oxide films. These same difficulties are encountered with electric welding. As a result, even the most experienced welders generally get the adjacent part so hot that the temper is drawn from the surrounding casting, which, because of its bulk, cools slowly and loses its valuable character.

Nickel or Cobalt Diminishes Difficulties

Mr. Fahrenwald has discovered that if nickel or cobalt be alloyed with the ingredients of the welding rod, the difficulties enumerated can be diminished or even wholly overcome. The limits of composition are about:

Ferrous metal	90 to 25 per cent
Manganese	5 to 25 per cent
Carbon	0.5 to 2 per cent
Non-ferrous iron group metals (i.e. Ni or Co)	.25 to 50 per cent

It will be noted by comparing the above specification with that given for manganese steel that the limits are broader in all directions. In the presence of nickel or cobalt it becomes possible to expand the limits of both carbon and manganese in both directions, and steel retains the valuable properties of manganese steel; in fact, these components increase the strength, toughness, wear resistance, and shock resistance.

The composition which Mr. Fahrenwald prefers for his welding rod contains 79.35 per cent of ferrous metal, 14.0 per cent of manganese, 1.3 per cent of carbon, 5.0 per cent of non-ferrous iron-group metal and 0.35 per cent of silicon. Of the two iron group metals, nickel and cobalt, the use of nickel is preferred, on account of its lower cost, and if cobalt is used the proportion is somewhat reduced.

One other advantage of this weld metal is said to be that it can be applied or built up *in situ* where desirable so as to produce a wearing layer upon an existing article, not only of manganese steel but of other material, or to replace the contour of a worn article. Thus a steel switch point or crossing can be surfaced merely with a blow torch or electric welding outfit and a strip of the new alloy.

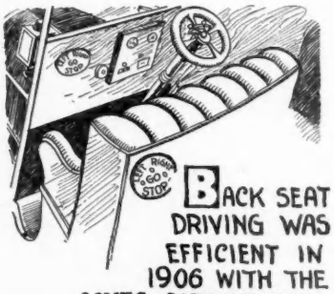
The inventor claims that the presence of the nickel (or cobalt) serves to diminish or wholly eliminate the need for a flux, overcomes the tendency of the manganese to oxidize or carbonize even when present only in a small proportion, prevents the embrittlement on slow cooling, and enables the production, even by a comparatively unskilled workman, of a weld which is hard, tough, and free from flaws; of a hard wear-resisting surface on a base of less resistant metal; or of a casting which exhibits the characteristic properties of manganese steel without heat treatment.

Automotive Oddities—By Pete Keenan

THE FIRST WOMAN TO MAKE HER AERONAUTICAL DEBUT WAS THE FAMOUS MRS SAGE IN JUNE 1785. THIS WAS CONSIDERED SO SENSATIONAL SHE WROTE A BOOK ON IT *London, Eng.*

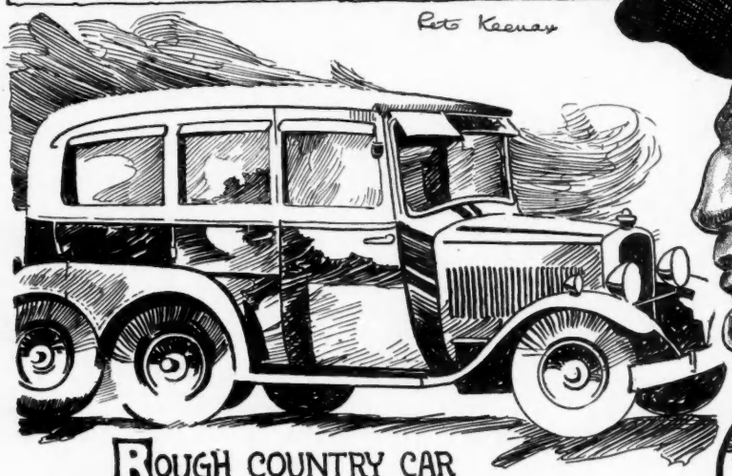
Pete Keenan

FREE WHEELING *IS NOT* A SCOTCH INVENTION.



BACK SEAT DRIVING WAS EFFICIENT IN 1906 WITH THE JONES ANNUNCIATOR

A button pressed in the tonneau flashed a variety of commands to the driver.

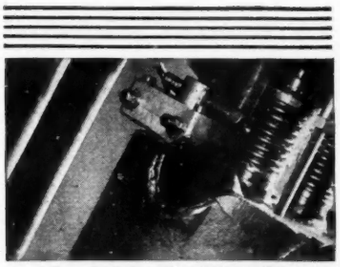


ROUGH COUNTRY CAR

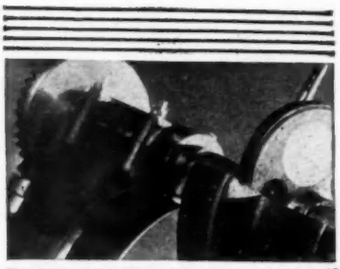
THIS SIX WHEELED SEVEN PASSENGER SEDAN IS EQUIPPED WITH TWO INDEPENDENT REAR AXLES. A TRACK IS ALSO CARRIED TO CONVERT REAR DRIVE TO A CATERPILLAR TREAD.

ROGER BACON PREDICTED THE AUTOMOBILE, SUBMARINE AND AIRPLANE. OVER 700 YEARS AGO.

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS OF THE INDUSTRY



Indiana Truck Plans Diesel-Engined Units

Will Use Design of C. L. Cummins

MARION, IND., Aug. 27—Preparations were under way here today at the plant of the Indiana Motor Truck Corp. for the immediate production of Diesel-engined trucks to be delivered to the trade some time early in October, according to an announcement by H. K. York, manager of the Marion plant.

A heavy production schedule is in prospect, Mr. York asserts, with orders coming from all parts of the country. The first truck to be built will be delivered to a transportation company in Florida.

The decision to enter the Diesel field follows a successful experimental run by a truck of similar design from New York to Los Angeles, powered by a Cummins Diesel, produced by the Cummins Engineering Co., Columbus, Ind.

The new engines will be built in the Marion plant and Indiana truck models will be equipped with them as rapidly as this type motor can be designed and manufactured.

"Experience has convinced us that this type truck will list several hundred dollars higher than present gasoline-engined trucks," Mr. York said, "but we are certain that the potential saving in fuel cost will more than offset this additional original price."

The engine, developed under patents of C. L. Cummins, which was described in detail in Automotive Industries several months ago, will be used with a few engineering additions developed by the Indiana Truck Co.

Tool Builders to Meet

CINCINNATI, Aug. 27 — The annual convention of the National Machine Tool Builders' Association will be held in the Edgewater Beach Hotel, Chicago, Oct. 12-14, according to plans formulated by the board of directors of the association.

DIRECTORS of the General Tire and Rubber Co. recently declared the sixty-second consecutive dividend on the company's common stock. There, indeed, is a form of repetition which custom cannot stale. The company sold 18 per cent more tires in the first six months of this year than in the same period of last. This item we recommend to our stablemate, *Commercial Car Journal*, which each month, in spite of everything, manages to fill a column or two with "prosperity notes." * * * Hans Becker, who does merchandising in Vienna, writes that he is interested in negotiating with American manufacturers who have to offer novelty accessories for automobiles or engines, whether they be polishes for the care of the body, or practical gadgets for the better operation of the whole works. Mr. Becker's organization travels in Austria, Jugoslavia, Switzerland, France, and Belgium. His address is Zieglergasse, 63, Vienna. * * * The summary of fatalities from automobile accidents issued by the Bureau of the Census continued its month-to-month increase over last year in the last issue. In the four weeks ending Aug. 8, 1931, 82 cities reported 673 deaths from automobile accidents. This number of deaths compares with 637 during the four weeks ended Aug. 9, 1930. * * * Milan V. Ayres, analyst of the National Association of Finance Companies defends instalment selling in a letter to the editor of "The New Republic," which was printed in the N. R.'s issue of July 29 * * * we have it from an excellent source that the present excessive duties levied by the Spanish government on imports of automobiles will be lowered * * * Gilbert Redfern, assistant trade commissioner at Warsaw, Poland, thinks "Poland is a relatively good market for motor cycles," and he has expanded on this theme in the Aug. 24 issue of "Commerce Reports," the official publication of the Bureau of Foreign and Domestic Commerce * * * the Edward G. Budd Mfg. Co. is hard at work producing dies and fixtures required for autumn and winter production schedules. During the past month the company secured a substantial volume of new business from one of the better known automobile manufacturers . . . which of course, might mean anyone. Budd wheel is coming along nicely, thank you. The preferred stockholders got an extra dividend at the last directors' meeting, and the common stockholders were not neglected. * * * F. Alexander Magoun and Eric Hodgins, co-authors of "A History of Aircraft," which was published by Whittlesey House on August 27 had the first draft of their book taken down on a stenotype machine. They estimated that more than three quarters of a mile of stenotype tape was used to record their 480 page book. Mr. Magoun, who is a professor at the Massachusetts Institute of Technology, planned to save this record of their work for posterity and left it with Mr. Hodgins in New York on the understanding that the tape would be boxed and forwarded to him when it had been transcribed. But he was doomed to disappointment. Post and Gatty had to be welcomed after their world flight. So Mr. Hodgins, ignoring all other plans for it, felt that the tape could en-

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THE NEWS TRAILER

Timothy D. Beard

CHICAGO, Aug. 24 — Timothy D. Beard, former secretary of the Chicago Automobile Trades Association, was killed yesterday at Holland, Mich., when his automobile overturned. It is believed he tried to take a curve at a too-high speed. Word of the accident was received in Chicago when Michigan authorities communicated with Maywood police in an effort to trace ownership of the car.

Mr. Beard, a well-known figure in "automobile row," was on his way to visit relatives at Scottville, Mich. He was connected with the Automobile Trades Association in various executive capacities for 18 years. He was at the time of his death general manager of the National Used Car Reporter, and had been associated with Charles Gamble in automobile sales. His body was to be taken to Scottville.

Hendrickson Adds Device

CHICAGO, Aug. 27—The Hendrickson Motor Truck Co. has developed a four-rear-wheel unit for converting 1½-ton trucks into six-wheelers. This unit makes available in the light-truck field a complete unit—the other method of conversion is by attaching an extra axle to the standard axle.

Improvement in French and Dutch Passenger Car Markets

WASHINGTON, Aug. 24—Automotive market conditions during the second quarter of the current year, in 13 foreign countries, will be described by resident agents of the Department of Commerce and Department of State in the Aug. 31 issue of *Commerce Reports*, official organ of the Department of Commerce. Abstracts of the individual reports, supplied by the Automotive Division, Bureau of Foreign and Domestic Commerce, appear below. Firms or individuals listed in the Exporters' Index may receive additional information about any of the countries described below, or any others in which they may be interested, from the Automotive Division.

Brazil

Sales of all motor vehicles during the second quarter were on a very restricted basis. One American make enjoyed good sales due to a drastic cut in prices in order to relieve its stock situation. At present it is nearly impossible to sell new models of medium-priced cars due to the fact that such cars, imported since the first of the year, must be retailed at prices which but a year ago represented the sales price of vehicles in the highest class.

The outstanding point in connection with the competitive feature of the market was the showing made by Fiat during June. According to registration statistics, that make registered more units in June than any other car. It is understood that this increased sale of the Italian car was made possible by price cuts.

Sales of trucks declined to a more marked extent than did passenger cars. Despite a perceptible improvement in many lines of business, and the increased activity in some of the country's chief industries, the demand for trucks was small and was not likely to increase for some time. There were no sales made to the government during the quarter.

An important development in the bus market was the introduction of a number of buses with American bodies in Rio de Janeiro. These buses were so well received, that it is believed the future demand for buses will be based on the standards of comfort offered by these new vehicles.

Colombia

During the second quarter the importation and sale of automotive vehicles were very quiet. On June 15 the new import duty on motor vehicles became effective. The outstanding advantage of the change in the tariff is that in the future it will be posible to ascertain the exact number of vehicles imported, which has been difficult in the past. It is not believed that the new duties will decrease automotive imports, but rather the demand for low and medium priced cars should increase.

American trucks dominate in Colombia. Two distributors of American low and high capacity trucks are securing the bulk of the business. Imports of trucks constitute approximately 50 per cent of all automobile imports. The principal demand is for light-weight units, especially in the cities.

Sales of chassis for bus purposes have been relatively active. The tendency is to increase the number of buses in operation especially in Bogota, Cali and Barranquilla. Bus lines operating out of the leading cities are numerous and the patronage is increasing. Any prospects for advanced sales of American makes appear to be for commercial purposes.

Danzig

The number of registered passenger cars and trucks on June 1, 1931, was less than on Oct. 1, 1930, and passenger car sales during the current year did not represent even a normal replacement figure, while those of trucks are only about at that level. Motorcycle sales were below those of 1930, but were still large enough to produce an increase in the number in operation.

A favorable factor during the quarter was the proposed change in the tax laws, whereby reductions would be granted to old cars. This will assist dealers in disposing of their used car stocks. Five years after a car is first registered a 10 per cent reduction would be allowed, and for each year thereafter an additional 10 per cent, up to a maximum of 60 per cent.

During the first six months of 1931, sales in the Free City amounted to 63 passenger cars, 42 trucks, and 154 motorcycles. These figures represent decreases of approximately 50, 25 and 40 per cent respectively, as compared with the corresponding period a year ago. The American share of these imports was 39 passenger cars, 27 trucks and seven motorcycles.

Cuba

Sales of medium-priced cars listing at the factory between $1,200 and $2,000 have been the most seriously affected during the current depression, as these cars are subject in Habana to the 5 per cent luxury tax and buyers of cars of this type have now turned to the least expensive class. There is always some sale for the very expensive cars, but this has also been reduced to a minimum. The very high percentage of sales of two well-known low-priced cars indicates the competition which importers of other makes are having to face. In 1929 the total imports of these two makes represented slightly over 57 per cent of the total imports at Habana, and in 1930 these increased to 78 per cent of the total.

There is a very small demand for used cars, and this is confined almost exclusively to the light inexpensive models. Dealers have been making a strenuous effort to keep stocks to a minimum and have been disposing of used cars at very low figures. A few dealers have normal stocks of used cars, but generally the stock is considerably in excess of the demand.

There has been relatively less decrease in truck sales than in passenger car sales, though sales this year are some 50 per cent below those of last year. Dealers' stocks in most instances are normal in relation to the actual demand. The demand for buses continues good, but bus companies are considered poor credit risks, and great care is required in making these sales.

Buying of replacement parts by importers continues on a restricted basis. The sale of accessories is extremely small, and there is practically no sale of garage equipment. Only such wearing parts as brake bands, piston rings, etc., enjoy a fair demand. A number of accessories and replacement parts houses are finding it difficult to meet payments promptly.

France

There was a noticeable seasonal improvement in sales of both American and French passenger cars during the second quarter of 1931. Registrations of new cars for the first five months of 1931 were only some 9 per cent under the corresponding 1930 period, amounting to a total of 70,779. The market also held up well during June, due to the approaching vacation season. Sales of American cars declined more than the excelelnt record of new registrations would indicate. New registrations of American cars during the first five months of this year declined to 3035, 32 per cent drop from the same period in 1930.

Production among French automobile manufacturers has recovered considerably from its poor start in the early part of the year, but several leading producers are still embarrassed with excessive stocks. Competition among manufacturers of popular French cars is increasing, and the leadership of Citroen on the market is declining with the growing popularity of Peugeot and Renault cars.

Registrations of the total number of trucks put into operation in France for the first five months of the year slumped about 30 per cent, but contrary to the trend in passenger cars, the percentage of decrease of American trucks was smaller than that of

Cited in Quarterly Reports From American Agents Abroad

their French competitors, amounting to 28 and 31 per cent respectively.

French foreign trade in motorcycles shows a large decline. Imports for the first five months of 1931 amounted to only 601 machines compared with 1861 in the 1930 period. Exports declined from 2052 in the first four months of 1930 to 1529 in the same period of 1931, the bulk of the exports going to French North Africa and Switzerland.

Gold Coast

The market for passenger cars in the Gold Coast is unimportant. The wealthier natives and chiefs buy the low and medium priced American car. Approximately two medium-priced American cars are sold a month. These are usually purchased by their prospective owners through orders which may take five or six weeks to fill. Trucks sales continue to be a more important feature of the automotive market. The preference is for popular makes of low-priced American trucks.

Because of default in payments, it has been necessary to repossess certain light capacity trucks which were sold. The dealers offer these as used cars. Stocks are rather high at present and undoubtedly will affect the market for new light-weight trucks.

The demand for replacement parts did not hold up with the market during the second quarter. Dealers believe that motor vehicles are being withdrawn from the road during the dull season. The replacement parts on the market correspond in general with sales of automobiles, and American manufacturers get approximately 75 per cent of this business at present. Springs and axle shafts appear to be the chief chassis parts demanded.

Japan

The market for passenger cars in the larger cities has been curtailed by the severe competition in the taxi trade. Sales to taxi drivers make up about 90 per cent of the total, and the present unprofitable state of the business has limited sales almost entirely to replacements. Another serious setback for automobile sales has been the inability of dealers to finance sales. The stock position has been satisfactory, and there has been an actual scarcity of low-priced passenger cars. Many dealers have resorted to price-cutting to clear their stocks of 1930 models, and some of these vehicles are being sold below cost.

There has been considerable discussion in regard to the establishment of a domestic industry, but little progress has been made. The government appropriated a substantial sum to be expended during the present fiscal year for investigation and research. There is also a project for the amalgamation of the three Japanese companies which are now producing under the army subsidy.

The demand for bus chassis was confined largely to light truck chassis, two leading producers securing most of the business. There is a well-defined demand for special bus chassis in the larger cities, but sales have been few due to the price of such vehicles. In the rural districts a large portion of the sales consist of passenger cars, either with specially built bodies or with additional seating capacity.

Sales of American and British motorcycles accounted for practically all of the motorcycle business, and the relative position of the United States showed considerable improvement during the quarter. Domestic production is expected to increase rapidly in both the manufacture of motorcycles and certain replacement parts most frequently in demand.

Mexico

The advent of the rainy season had the effect of materially curtailing sales throughout the country districts. Country roads became impassable in large part during the wet weather, and car sales usually show a decrease during this period. Severe dealer troubles in the Federal District were responsible for the marked falling off in sales volume. This especially applied to several dealers handling low and medium priced cars.

Stocks at the beginning of the quarter were high to normal. Liquidations and slackened buying served to decrease stocks throughout the period. At the end of June stocks were from normal to low, and in the low-priced class were beginning to need replenishment. The placing of new dealers during the third quarter was expected to remedy the situation. Although truck sales have been ahead of those of passenger cars, a large proportion are of one low-priced make.

Replacement parts and accessories sales have been slow. Since the beginning of the year, replacement parts dealers and jobbers have been largely on a cash basis. Stocks are low, and this may account for the small scale buying made necessary by exchange and slack business. As the end of the rainy season approaches, manufacturers' agents feel that stocks will be built up beginning in August and September.

Netherlands

A decided awakening occurred in the passenger car market during the second quarter under the seasonal stimulus of spring weather and the Easter holidays. Replacement business was still a very large factor, accounting for an estimated 85 to 95 per cent of total business. With improved roads and generally broader appreciation of motor car value there are an increasing number of people who are potential car buyers. Sales of low and medium priced cars have been best with evidences of some shifts in the relative popularity of various makes. High-priced lines are suffering from the generally lessened income of those who usually purchase expensive motor vehicles.

Sales of commercial vehicles have continued their upward climb thus far this year, and the market is being thoroughly exploited, with many distributors who a few years ago thought of the market only in terms of passenger cars now holding or broadening their franchises. Imports for the first five months of 1931 were 3686 units, close to 10 per cent above last year. One of the favorable factors in the operation of a truck at the present time has been the low prices of gasoline.

Sales of motorcycles were reported as holding up well. Total imports for the first five months of 1931 were 2834 units, only 140 fewer than during the same period in 1930. Some considerable shift took place in the countries supplying as shipments from Belgium fell heavily, while those from the United States and Switzerland also declined. German imports in particular showed advances, and French imports also increased.

Northern Ireland

Automotive sales showed some improvement during the closing part of the second quarter. The low horsepower cars, especially in the 7 hp. class, still led in the number of sales. There has also been a decided increase in the sale of 14 hp., 6-cylinder cars. Although there are two American makes actively represented on the market, sales of American vehicles are difficult due to the horsepower tax, which makes it almost impossible to sell a used American car.

The heavier type of bus with comfortable seats is gaining in demand at present. New registrations show most buses as having a capacity of from 20 to 40 passengers. There is little opportunity for the sale of American buses in Northern Ireland, as a considerable part of the bus industry is under the control of the government and British vehicles are given preference.

The market for accessories is limited and peculiar in view of the fact that most dealers prefer to purchase from the large distributing centers such as London, Liverpool and Glasgow, instead of importing direct and keeping stocks on hand. Considerable amounts

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Men of the Industry and What They Are Doing

Leaders Asked to Serve

The automotive industry was well represented last week on the list of national business and civic leaders asked by President Hoover to assist Walter S. Gifford, president of the American Telephone & Telegraph Co., in forming an advisory body for a national unemployment relief organization. Those named from the industry were: Alexander Legge, International Harvester Co.; Fred J. Fisher, Fisher Body and General Motors, Alvan Macauley, president of the National Automobile Chamber of Commerce and of the Packard Motor Car Co. and Pierre S. du Pont.

Returns to Autocar

Ralph G. Strohl has returned to the engineering staff of the Autocar Co., Ardmore, Pa., after an absence of two and a half years during which he was associated with the Mack truck organization at its Allentown plant. Mr. Strohl's previous connection with the Autocar Co. continued for 11 years and during practically all of that time he was engaged in directing the experimental engineering research of the company.

National Battery Elects

At a meeting of the directors of the National Battery Co. the following new officers were elected: W. H. Seymour, second vice-president and assistant general manager; E. H. Church became secretary to replace F. M. Brown; C. E. Carston was elected assistant, and C. R. Brachmann, assistant treasurer. Other officers were re-elected.

McDarby Convalescing

Neil McDarby, vice-president in charge of sales, Auburn Automobile Co., is recuperating rapidly following an abdominal operation undergone recently at the Mayo Hospital, Rochester, Minn. Mr. McDarby has just returned to his home in Auburn and expects to be back at his desk in the near future.

Brockway Promotes Scott

Walter A. Scott, divisional manager for the Brockway Motor Truck Corp. in the metropolitan New York district, has been appointed a vice-president of the corporation.

Hedberg Joins Hudson

Stanley A. Hedberg, former newspaperman and more recently associated with aircraft advertising and publicity, has been appointed director of publicity for the Hudson Motor Car Co., Detroit, Mich. Mr. Hedberg resigned as advertising and publicity manager for Pratt and Whitney Aircraft Co., Hartford, Conn., to accept the Hudson position.

Firestone Names Jessup

Appointment of C. A. Jessup as a member of the manufacturers' sales department of the Firestone Tire & Rubber Co. has been announced by J. Fred Cast, manager of the department.

Lukenweld Names Bleecker

John S. Bleecker has been appointed manager of sales of Lukenweld, Inc. (division of Lukens Steel Co., Coatesville, Pa.).

Hupp District Men Meet

DETROIT, Aug. 29—All district sales managers of the Hupp Motor Car Corp. met at the factory Aug. 27 and 28, their first combined get-together of 1931. Promulgated plans for dealer organization, sales, service and advertising were discussed by company officials. Among those addressing the district sales managers were R. S. Cole, vice-president in charge of sales; I. M. Kauffelt, assistant sales manager; C. E. Salisbury, director of service, and F. W. Munro, head of the advertising department.

Studebaker Changes Truck

SOUTH BEND, IND., Aug. 27—The Studebaker 1½-ton truck, which was introduced last August, is now being equipped with a full-floating rear axle such as is used in the 2-ton model. There will be no change in price.

The 1½-ton unit is available in either a 130-in. wheelbase chassis at $695, or with a 160-in. wheelbase chassis at $775.

Cadillac Sales 28% V-12's

DETROIT, Aug. 27—Since its introduction last October, the Cadillac V-12 has accounted for 28 per cent of the total production of Cadillac and LaSalle cars. This percentage is based on shipping figures for the nine-month period from Oct. 1, 1930, through June 30, 1931; during this time there were 4577 Cadillac V-12 cars shipped.

Publishes Aero Directory

WASHINGTON, Aug. 27—The revised edition of the "Aeronautics Trade Directory," just published by the Aeronautics Branch of the Department of Commerce, contains 2818 listings, an increase of approximately 200 over the previous edition of the bulletin, which was dated July 1, 1930.

Chrysler Offers Sales Training

Extension Course in Selling Its Products Available to Public

In association with La Salle Extension University, the Chrysler Corp. is now offering to the public special sales-training instruction, which in the past has only been available to salesmen employed by the dealers in the various Chrysler divisions. The course embraces all the principles of general salesmanship, plus the specific points that have been found effective in the business of the Chrysler Corp. Chrysler executives have contributed to making this course as complete as possible.

The course may be taken without interrupting the usual duties of the student, and upon its completion he is given a diploma. Upon enrolling, the student specifies whether he desires to sell Chrysler, Dodge or DeSoto cars and, in addition, he is given the course in selling the new Plymouth. The major cost of this course in salesmanship is defrayed by the Chrysler Corp.

While the direct purpose of this course in salesmanship is to train retail men for the predicted increase in fall and winter business, the Chrysler Corp. also believes that many of the graduates will become permanent dealers and executives.

Michigan Registrations Off

DETROIT, Aug. 24—Automobile registrations in Michigan during July totaled 9161, a decrease of 2114, or 18 per cent, from the total of 11,275 for the same month last year, and a decrease of 1492 from the June total of 10,653.

Ford totaled 2100, showing a decrease of 4470 from the July, 1930, registrations of 6570. Compared with the previous month's figure of 3652, the decrease amounts to 1552, or 43 per cent.

Chevrolet totaled 2259 in July, 1931, showing an increase of 773, or 42 per cent, over the same month of last year, and a decrease of 818, or 26 per cent, over the June figure.

Plymouth totaled 1931 in July, 1931, or an increase of 1579, or 475 per cent, over the same month in 1930, and an increase of 1726 over the June, 1931, figure.

Commercial car registrations totaled 855 against 1184 in June, and 1128 in July, 1930. Ford was first with 429, Chevrolet second with 239, and G.M.C. third with 39.

Hudson Declares Dividend

DETROIT, Aug. 24—Directors of Hudson Motor Car Co. have declared a dividend of 25 cents per share, payable October 1 to stock of record September 11.

Service Policy Issued for Owners

Chrysler Corp. Plan Provides Inspection and Replacement Warranty

DETROIT, Aug. 29—A new service plan, known as the "Owner's Service Policy," is announced by the Chrysler Corp., and applies to all Chrysler-built passenger cars, trucks, commercial cars, taxicabs and buses. This new policy goes into effect Sept. 1, and provides for the replacement of parts that are defective in materials or workmanship, without charge for either labor or parts, during a period of 90 days from purchase or until 4000 miles have been recorded by the speedometer, whichever occurs first.

In addition to the elimination of charges of both labor and parts, the policy contains four coupons entitling the owner to free inspection at the conclusion of 500, 1500, 2500 and 4000 miles. In this way, the owner can stop at any Chrysler, Dodge or De Soto service station, regardless of where he may happen to be.

The inspection operations performed at the 4000-mile period are as follows: Road test car; check front wheel alignment; tire pressure; cooling system; adjust fan belt, if necessary; tune engine; check charging rate; test and refill battery; tighten body belts; check operation of all keys; check all lights; adjust steering connections, if necessary; eliminate squeaks, if any; oil and grease car completely; road test car.

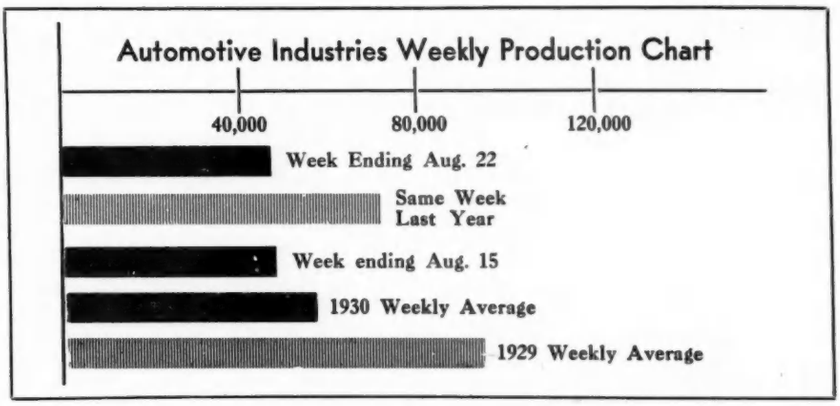
De Soto Line Improved

DETROIT, Aug. 27—Since the introduction of the new De Soto six and eight at the beginning of the year, more than 70 improvements and refinements have been made to the line. The major improvements on both lines are, of course, the easy-shift transmission and free wheeling.

On the six, the most outstanding improvements include the addition of a sun visor, a newly designed radiator cap, adjustable front seat, counterweighted crankshaft, a fifth engine support of rubber, and newly designed front springs and shackles resulting in improved riding qualities and steering.

In addition to the above, the De Soto De Luxe now has a double top-cowl ventilator and improved upholstery, together with the increased use of chrome plate.

Many improvements are also found on the De Luxe eight. In addition to the adjustable front seat, new style radiator cap and new engine mounting mentioned in connection with the six-cylinder model, the eight has double-action, hydraulic shock absorbers, and the body is more completely insulated from the chassis.



Sees Active 1932 Demand

CHICAGO, Aug. 27—Citing estimates that 13,000,000 motor cars and trucks will be in the used-five-years-or-more class, the Fidelity-Phenix Insurance Co. predicts a large potential demand for automobiles to be active in 1932.

The company bases its prediction on the results of a survey just completed in which an analysis of 500 finance-company operations shows 43 per cent of their activity for retail dealers covered used-car sales in January, 1929, while in January of this year the corresponding figure was 82.2 per cent. Another market factor cited is the subnormal consumption of 2,900,000 automobiles in 1930, whereas the average for last six years was 3,672,500.

Houdaille-Hershey Reports

CHICAGO, Aug. 26—Net earnings of Houdaille-Hershey Corp. for the first half of 1931 registered a sharp gain over the corresponding period of 1930, the semi-annual report reveals. Net earnings for the company and subsidiaries for the period ending June 30 last amounted to $69,286, after all charges, including federal taxes, in comparison with $448,230 in the first half of 1930.

After deducting semi-annual dividend requirements of $60,050 on the Class A stock of the parent corporation, the annual dividend of $2.50 a share on the latter was covered by a margin of almost 50 per cent in the six-month period. The balance available for Class B common stock of Houdaille-Hershey was equivalent to 50 cents a share, in comparison with 22 cents a share in 1930.

Packard Leases in Canada

DETROIT, Aug. 27—Lease of a two-story building in Windsor, Ont., for the production of cars for the Canadian market has been announced by Packard Motor Car Co. The new plant is located at Chatham and Pitt Streets, and was formerly the home of the Universal Car Agency.

Canadian Exports Down

WASHINGTON, Aug. 27—Exports of Canadian automotive products for the first six months of the current year had a valuation of $4,793,731, which was $6,071,743, or 55.9 per cent, under the total for the corresponding period, and $4,727,149, or 49.6 per cent, below the figure for the second half of 1930, according to the Automotive Division, Bureau of Foreign and Domestic Commerce.

Passenger cars, truck and parts declined 57, 54.9 and 51.7 per cent respectively from the January-June period of last year.

A-C Buys 3 Companies

MILWAUKEE, Aug. 27—A-C Metal Specialties, Inc., has announced the purchase of the equipment and good will of Acme Automotive Accessories, American Sash Pulley Corp., and Velguth Metal Parts, Inc. Lines formerly manufactured by each of the above companies will be continued by A-C, and production facilities have been concentrated in one plant, the announcement says.

Gets Anderson License

GARY, IND., Aug. 26—The Anderson Co. has announced that it has issued to Dominion Chain Co., Niagara Falls, Canada, a license to manufacture 10-edge windshield wiper blades. Dominion Chain Co., which is a subsidiary of American Chain, has about completed arrangements for the production of the blades, according to the announcement.

THE NEWS TRAILER

(Continued from page 327)

joy no finer fate than to be thrown down on Post and Gatty, the last of the heroes to be included in the text—and that's what he did with it. * * * Billy Arnold, last year's champion AAA racing driver, who cracked-up at the Indianapolis Speedway on Memorial Day, has been released from hospital, and is in Detroit to see the Harmsworth Trophy races. * * * Literature and the movies are at last catching up with the industry * * * last week we saw a bill poster with an advertisement of "Eight Cylinder Love," and a current book advertisement advertises "sixteen cylinder action" for its pet opus.—H. H.

Improvement in French and Dutch Markets is Bright Spot in Depression of Foreign Sales

(Continued from page 329)

of business in this market are done through catalogues, even in some of the better shops. Because of the high percentage of British-made motor vehicles in operation, parts and accessories from British sources have a decided advantage over other imported lines.

Peru

There have been no changes in the levels of sales of any price class of passenger cars. Sales of new passenger cars are extremely rare, especially in Lima, though conditions are much better in the provinces. Because of depreciated currency, retail prices of cars have had to be increased so much over the figures of 1930 and 1929, that further sales resistance has been created. The new taxes imposed on motor vehicles have led numerous car owners to withdraw their vehicles from operation, so that on June 31, 1931, there were 4792 passenger cars registered in Lima and Callao, as compared with 5580 on June 30, 1929. The only European car now represented in Peru is the Italian Fiat, and sales of this make have been negligible.

Practically all dealers are selling more used cars than new and many are selling over twice as many. Almost all the factors that have contributed to decrease new car sales have made used car bargains more attractive than ever.

The second quarter which is always the best season of the year for the sale of trucks witnessed a decided improvement. It was the harvest season and the trucks were needed to move the cotton. Several rush orders were placed, and stocks were low. The demand was principally for low and medium price trucks up to 2 tons capacity.

There were few if any sales of motorcycles, though the trade in used cycles continued fair. A bargain in the form of a good used car can be purchased at the price of the cheapest American motorcycle. Heretofore the government has been the best customer for American motorcycles, but at present the government is absolutely without disposable funds.

Poland

The collection of the new road fund taxes, and the refusal of finance companies to accept any new paper contributed to make the second quarter a poor one from an automobile sales point of view. At present the finance companies have stocks of cars taken over from dealers who have gone out of business and these are being disposed of in as orderly a manner as possible, so that the loss to the finance corporations in this country will be much less than seemed probable at the beginning of this year.

Citroen, with locally-assembled cars and attractive payment terms, is still offering strenuous competition, with sales so far this year exceeding all makes other than one low-priced American car. The Czech-made Praga and Tatra cars are also reported to be doing fairly well in certain parts of Poland.

The new road fund taxes have demoralized the bus trade in an even greater extent than in the case of passenger cars and taxicabs. So far the response of bus owners to efforts to collect these taxes has been to withdraw their vehicles from operation. Another uncertain factor in the bus market was the expected rigid concession law, which makes it a hazardous business for anyone to invest any considerable sum in the purchase of new equipment. A beginning has already been made in the granting of a bus concession for the City of Vilna to the Arbon Company of Warsaw, the selling agency for the Swiss Saurer, which is being assembled in Poland, under arrangement with the Swiss concern.

Rumania

Competition between American cars remained very keen. Purchasers with ready money could secure old models at advantageous prices, and this has had its effect on sales of later models. Foreign competition was almost entirely confined to that offered by the Italian Fiat and French Renault companies, both of which makes continued to sell with the aid of credits arranged by their respective governments.

Due to the comparatively low prices at which new cars can now be purchased used car prices have dropped considerably. As yet, the used car problem has not assumed such relative importance to new car sales as in some other countries. Most of the used cars on sale are open body types.

Purchases of motorcycles have been almost exclusively of European makes. The American makes on the market have been unable to compete due to price differential and favorable terms offered by representatives of European producers. Dealers estimate imports for the first six months of this year to have been about 150 units.

Dealers do not, as a rule, carry adequate stocks of replacement parts. Some parts are being manufactured locally, but as yet such production is in the beginning, and the products turned out do not have the wearing qualities of imported lines. American parts are largely in demand because of the high percentage of American cars in operation. Several continental manufacturers are endeavoring to enter the market on a price basis.

German Exports Increase Sharply

Normal Car Market Import-Export Ratio Reversed This Year

The economic depression has worked a great change in the status of Germany in international automobile commerce. Figures have just been published for the first half of the current year, and show that whereas during the first half of 1930 the imports greatly exceeded the exports, the situation is substantially reversed this year. Imports of passenger cars decreased from 10,158, valued at 22,111,000 marks, to 2248, valued at 9,694,000 marks, and imports of trucks decreased from 221, valued at 1,394,000 marks, to 52, valued at 412,000 marks. Exports of passenger cars increased from 2393, valued at 13,059,000 marks, to 3738, valued at 12,747,000 marks, while exports of trucks increased from 1149, valued at 9,010,000 marks, to 1409, valued at 7,176,000 marks.

Such a rapid change from a large excess of imports to an excess of exports can be explained only on the assumption that the German industry was in desperate need of money and made unusual price concessions in order to stimulate export business. As numbers, weights and values are given in the export returns, it is possible to get a definite idea of the price declines. The average price of exported passenger cars decreased from 5500 marks in 1930 to a little over 3400 marks in 1931, while the price per metric hundredweight (220 lb.) decreased from 450 marks to 330 marks, a decrease of 26.7 per cent. There undoubtedly was a considerable shift in the class of exports, however, for formerly Germany exported chiefly large, powerful and luxurious cars, while during the first half of the current year the exports are believed to have consisted to a much larger extent of small cars. The average weight of exported passenger cars dropped from 2690 lb. to 2280 lb.

The average price per metric hundredweight of the trucks exported dropped from 336 marks in 1930 to 269 marks in 1931.

Urges Plan for State

Howard E. Coffin, Hudson Motor Car Co. director, who lives at Sapeloe Island, Ga., during part of the year, has written Governor Russell, urging him to give serious thought to his suggestion that Georgia adopt a "five-year plan" of exploitation of the state's natural, agricultural and recreational advantages, with a view to increasing the sales of Georgia products and attracting an enlarged population within the boundaries of the state.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Aug. 26—There was little change in general business last week. In some quarters wholesale and jobbing trade was more encouraging, with a slight decrease in business for fall trade. In general, retailers are ordering very cautiously.

GUARANTY INDEX

The Guaranty Trust Co.'s preliminary index of business activity for July is 68.3, as against 69.3 for the preceding month and 83.9 a year ago.

MERCHANDISE EXPORTS

Merchandise exports during July totaled $183,000,000, as against $187,000,000 during June, and $256,800,000 a year ago. Imports amounted to $175,000,000, as against $176,000,000 during June and $220,600,000 a year ago.

CHAIN STORE SALES

Sales of 47 store chains during July amounted to $268,922,827, as against $273,898,492 a year ago. Sales of these same store chains during the first seven months of this year totaled $1,863,858,465, as against $1,914,244,866 in the corresponding period last year.

CONSTRUCTION AWARDS

Construction contracts awarded in 37 Eastern states during July, according to the F. W. Dodge Corp., totaled $285,997,300, as against $331,900,000 during June, and $567,500,000 a year ago.

COMMERCIAL FAILURES

Commercial failures during July, according to R. G. Dun & Co., totaled 1983, as against 2028 a year ago. Liabilities involved in the July failures totaled $60,997,853 as against $39,826,417 a year ago.

CAR LOADINGS

Railway freight loadings during the week ended Aug. 8 totaled 734,780 cars, which marks a decrease of 22,513 cars below those during the preceding week, a decrease of 169,377 cars below those a year ago, and a decrease of 357,373 cars below those two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Aug. 22 stood at 69.4, as against 69.5 for both the week before and two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended Aug. 19 were 24 per cent below those a year ago.

STOCK MARKET

The stock market last week was irregular and developed a weak tone toward the end of that period. The volume of trading was moderately larger. Net price changes for the week showed losses for the majority of issues.

BROKERS' LOANS

Brokers' loans in New York City during the week ended Aug. 19 increased $14,000,000, bringing the total up to $1,343,000,000.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Aug. 19 showed increases of $36,000,000 in holdings of discounted bills and of $19,000,000 in holdings of bills bought in the open market. Holdings of government securities remained unchanged. The reserve ratio on Aug. 19 was 80.8 per cent, as against 81.4 a week earlier and 83.9 two weeks earlier.

Plan Nitriding Demonstration

DETROIT, Aug. 24 — The Electric Furnace Co., Salem, Ohio, which holds a furnace license from the Nitralloy Corp., and the Commercial Steel Treating Co., Detroit, Michigan, have joined with the Nitralloy Corp. in a program for the erection and operation of a demonstration nitriding center in the latter company's plant at Detroit. The plant is now ready for operation.

Set New Speed Records

LONDON, Aug. 13 (*by mail*)—Within three days after a supercharged Austin Seven, driven by Leon Cushman, had set the speed record for "baby" cars (International Class H, under 750 cc.) at over 100 m.p.h. for the first time, Lord Ridley driving a car of this type of his own design, the Ridley Special, increased the Austin figure of 102.28 m.p.h. for the flying kilometer to 105.42 m.p.h. and the mile to 104.56 m.p.h., the speeds in all cases being the average of two runs in opposite directions.

On the previous day a Morris Minor with almost a standard L-head though supercharged engine averaged 101.96 m.p.h. for the kilometer and 100.39 m.p.h. for the mile.

Gabriel Holdings Shifted

NEW YORK, Aug. 24—Class B shares in the Gabriel Co., manufacturers of automotive equipment, have been acquired by a group of New York, Baltimore and Montreal business men, it has been announced at the executive offices of the company. Negotiations for the purchase of the holdings of Otis & Co., investment bankers, and others in these shares have been in progress for several months.

The present Gabriel management is retained, with George H. Ralls, vice-president and general manager, directing the affairs of the company's plant and sales offices in Cleveland. The new group will take an active part in the direction of the business, with executive headquarters at 11 West Forty-second Street, New York.

The new interests control several devices.

The company's new board of directors is composed of Stanley Johnston, senior partner of Johnston & Ward, members of the Montreal Stock Exchange; Dr. Alfred R. L. Dohme, Baltimore, director of Sharp & Dohme, Philadelphia, and the Fidelity Trust Co. of Baltimore; B. Lytton Johnston, New York; John J. Batterman, consulting engineer, Boston, and W. H. Johnston, New York.

The new officers of the Gabriel company are W. H. Johnston, president; George H. Ralls and J. H. Shoemaker, both of Cleveland, and John J. Batterman, vice-presidents; B. Lytton Johnston, secretary and treasurer, and David Benjamin, Cleveland, assistant.

G.M.A.C. Revises Financing Plan

Dealers' Losses On Repossessions Will Be Paid Directly

NEW YORK, Aug. 24—General Motors Acceptance Corp. has had in operation since Aug. 1 a new method of handling the repossession reserves which have been set up for dealers in its regular retail financing plan since 1925.

The new plan involves payment to the dealer of actual losses as they occur from the accumulated earned reserve. At the time each retail finance transaction is made under the G.M.A.C. plan, a reserve is set up on its books for the dealer. When the deal is paid out, that reserve becomes an accumulated earned reserve and becomes available as a source from which dealer repossession losses may be paid. The reserve on new cars is 1½ per cent of the unpaid balance up to $500, and ½ per cent of unpaid balance over $500. On used cars the reserve is a flat $10 per car.

Heretofore G.M.A.C. has paid over to the dealer monthly the accumulated earned reserve. Now it will pay over the actual losses as they occur. Then once a year, on Feb. 1, it will turn over to the dealer in cash all of the accumulated earned reserve in excess of 3 per cent of retail outstandings. G.M.A.C. will pay 4 per cent interest per annum on the dealer's earned reserve account.

The new plan is operating nationally and applies to all General Motors cars. When a dealer's business is liquidated, G.M.A.C., under the new plan, simply holds the reserve until all deals are paid out or finished, charges the losses against the account, and turns over to the dealer the remaining money.

This new plan, it is believed, will stimulate more rapid sale of repossessed cars by dealers, thus reducing actual losses. To provide a real incentive for prompt reconditioning and resale, G.M.A.C. will permit the dealer to sell a repossessed car and establish his loss *before* paying the G.M.A.C. balance, provided the car is sold within 30 days from the date of repossession. This permission, however, is conditional upon the dealer's own efforts to obtain a more rapid turnover of repossessions.

Advantages claimed for the new plan include the following:

1. Reserve will be accumulated against seasonal and abnormal losses.
2. Trend of reserve accumulation will be an index of quality of retail credits.
3. Surplus reserve above 3 per cent of retail outstandings will be available for profit yearly.

Exports, Imports and Reimports of the Automotive Industry For July and Seven Months Ended July, 1931-30

	Month of July				Seven Months Ended July			
	1931		1930		1931		1930	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	....	$11,525,205	....	$17,370,669	.....	$105,421,174	.....	$200,127,271
*Electric trucks and passenger cars	....	.....	....	.....	.....	.....	29	52,732
Motor trucks and buses except electric (total)	3,518	1,962,371	4,042	2,899,042	32,688	17,703,319	59,092	39,446,362
**Under[1] one ton	320	110,284	....	.....	5,111	1,814,647	.....	.....
**One and up to 1½ tons	2,658	1,132,207	....	.....	23,532	10,575,707	.....	.....
**Over 1½ tons to 2½ tons	422	564,467	....	.....	2,747	3,259,970	.....	.....
**Over 2½ tons	86	134,485	185	402,384	1,019	1,856,705	2,880	5,899,783
PASSENGER CARS								
Passenger cars except electric (total)	6,478	4,075,597	7,828	5,583,839	61,316	37,761,377	114,736	79,887,083
Low price range, $850 inclusive	5,256	2,627,599	....	.....	48,601	23,434,033	.....	.....
**Medium price range, over $850 to $1,200	722	705,326	....	.....	7,988	7,663,877	.....	.....
**$1,200 to $2,000	227	335,618	....	.....	2,145	3,103,473	.....	.....
**Over $2,000	141	355,908	....	.....	1,166	2,971,521	.....	.....
PARTS, ETC.								
Parts, except engines and tires	....	.....	....	.....	.....	.....	.....	.....
Automobile unit assemblies	....	2,957,742	....	4,637,115	.....	28,673,658	.....	43,572,291
Automobile parts for replacement (n.e.s.)	....	2,172,580	....	3,345,528	.....	16,908,767	.....	27,845,645
Automobile accessories	....	194,564	....	381,122	.....	2,244,747	.....	3,781,903
Automobile service appliances (n.e.s.)	....	281,162	....	283,486	.....	2,544,991	.....	2,192,637
Trailers	34	17,716	67	24,291	525	176,927	950	445,587
Airplanes, seaplanes and other aircraft	15	191,604	31	418,102	83	1,102,745	217	3,256,584
Parts of airplanes, except engines and tires	....	154,666	....	193,640	.....	1,137,459	.....	1,335,094
BICYCLES, ETC.								
Bicycles	75	2,026	372	10,227	1,037	26,981	2,651	70,936
Motorcycles	501	111,238	342	100,702	4,334	1,049,895	8,170	1,894,119
Parts and accessories, except tires	....	57,341	....	77,229	.....	387,665	.....	684,436
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and Semi-Diesel	28	57,489	32	128,395	255	595,965	190	598,008
Other stationary and portable:								
Not over 10 hp.	715	56,451	2,392	165,953	5,570	435,015	16,850	1,302,752
Over 10 hp.	247	104,674	341	156,551	3,528	1,671,983	3,587	1,983,418
Automobile engines for:								
Motor trucks and buses	43	20,776	81	18,818	4,027	618,179	19,009	1,549,067
Passenger cars	1,548	90,307	3,241	448,622	14,436	1,170,152	36,284	3,473,324
Tractors	11	1,139	31	12,368	20	4,742	194	80,846
Aircraft	52	194,156	45	152,989	207	1,004,892	228	985,773
Accessories and parts (carburetors)	....	167,556	....	249,393	.....	1,411,903	.....	2,253,388
IMPORTS								
Automobiles and chassis (dutiable)	64	49,858	....	.....	381	433,093	[1]251	[1]414,025
Other vehicles and parts for them (dutiable)	....	7,392	....	3,616	.....	36,610	.....	327,837
REIMPORTS								
Automobiles (free from duty)	48	22,580	19	32,634	133	96,207	162	155,435

*Not shown separately after 1930.
**Classification changed beginning January, 1931.
[1]Ending June 17, 1930.

Goodyear Manufacturing Pneumatic Tractor Tire

AKRON, Aug. 27—A pneumatic-lug, rubber tractor tire, designed to meet the special conditions of tractor operation, has been announced by the Goodyear Tire and Rubber Co. Large rubber lugs are placed diagonally across the tractive surface of the tire. The new tire, which is already in production, is offered in four sizes, as follows: 36 x 6, 38 x 7, 40 x 8, and 42 x 9. Wheels for permitting the use of these tires on tractors now in service are available from tractor dealers or through rim and wheel distributors, it was pointed out in the announcement.

Fisher Prizes Awarded

DETROIT, Aug. 24—The prize-winners, 104 in number, of the Fisher Body Corp. guild's coach model building competition, in which over 148,000 boys competed, were entertained at a banquet in the auditorium of the General Motors building.

W. A. Fisher, president of the Fisher Body Corp., presented the national awards after a welcoming address by Alfred P. Sloan, Jr., president of the General Motors Corp., in which he promised the winners employment after they have completed their education.

The four winners of the university scholarships were: Raymond S. Doerr, Battle Creek, Mich.; Howard Jennings, Denver, Colo.; Donald Burnham, West Lafayette, Ind.; and Albert Fischer, Waukegan, Ill., Fischer and Doerr being the winners in the senior division, while the other two were in the junior division.

Chevrolet Produces 8,000,000th Vehicle

DETROIT, Aug. 27—The Chevrolet Motor Car Co. has turned out its 8,000,000th car after less than 20 years of factory operation. This brings the total of its six-cylinder cars to nearly 3,000,000. No special ceremonies were held, but the car was sent to Detroit by C. E. Wetherald, general manufacturing manager, to be inspected by W. S. Knudson, H. J. Klinger, J. M. Crawford and other officials of the company.

Leamy Leaves Auburn

Alan H. Leamy, body designer for the Auburn Automobile Co. for the past three years, has resigned.

Will Finance Automobiles

ATLANTA, GA., Aug. 26—Inauguration of an automobile financing department is announced by the Finance Company of the South. O. R. Moore will be in charge of the new department, which will begin operating Sept. 1.

Detroit Fuel Prices Up

DETROIT, Aug. 25—Retail prices in the Detroit stations of the Shell Petroleum Corp. will be raised four and a half cents per gallon on the regular and ethyl grades of fuel, the new prices being 14.8 cents and 17.8 cents. Officials of other refiners stated that there would be no increase in the prices of their products at present.

De Vaux Distributors Meet

DETROIT, Aug. 27—De Vaux distributors, with their sales and service managers, totaling more than 200 persons, attended this week a two-day convention at Grand Rapids. Besides addresses by Norman De Vaux and Col. E. J. Hall and other factory officials, W. W. Hoagland, president of Hayes Body Corp., spoke on body construction.

Steel Reserves Dwindle, is View

Mahoning Valley Purchases Indicate Buyers' Stocks Are Low

By William Crawford Hirsch

NEW YORK, Aug. 27—The interlude between mid-summer dullness and the confidently looked-for upturn in steel market activities after Labor Day is not without its encouraging symptoms. Mahoning Valley sheet mills are particularly pleased because the manner in which specifications and shipping orders come in clearly shows that consumers have run out of all reserve material. In the Middle West quite a little flat rolled steel has been moving of late from warehouse-men to consumers who, under more normal conditions, buy directly from mills, but who of late have preferred to cover their wants from hand to mouth in the retail lots they are able to obtain from warehouses.

In the aggregate the tonnage thus absorbed has not been inconsiderable, and some warehouse stocks have run low. A good deal is being made of the recent advances in black sheets being maintained in what new business has been placed this month. Buyers take the attitude that the test will come when tonnage business overhangs the market, not through pressure on their part, but through competition among sellers.

Denials of newspaper reports that the leading interest will cut wages are not to be interpreted as implying that not everything is being done to reduce production costs through getting better results for every dollar paid out for wages. The wage scales of leading "independents" in the sheet industry are automatically adjusted to selling prices by periodical settlements with the union workers. Somewhat more active demand for tool steel is taken to indicate preparations for broader producion schedules in the last quarter.

Pig Iron—While automotive foundries still confine their purchases to small lots to fill in, the market generally reflects somewhat more interest on the part of melters. Prices are unchanged.

Aluminum—Quiet and unchanged.

Copper—Domestic consumers appear to be fairly well covered for nearby requirements. Demand for automotive brasses is light, but repeat orders for small quantities are regularly placed. Prices are unchanged.

Tin—Consumption is still running behind production in spite of curtailment of output in the producing countries, and the international Tin Committee is being urged to institute further cuts. Quite a few consuming interests bought toward the close of last week when the price for prompt Straits dipped to 25¾ cents.

Lead—Quiet and steady.

Zinc—Unchanged.

Monocoupe at St. Louis

ST. LOUIS, Aug. 24—The Monocoupe Corp. is now established in a new home at Lambert-St. Louis Field, the municipal airport.

The concern was moved here following its recent purchase at receiver's sale by Phil De C. Ball, owner of the St. Louis Browns. D. A. Luscombe, who designed the first Monocoupe as a personal plane in 1926, is in charge of the factory, which is located in the plant formerly occupied by the Ryan Aircraft Co.

The Lambert Engine Co., also purchased by Mr. Ball, will remain at Moline for the present, but eventually will be brought to St. Louis.

Allied Reports Loss

CHICAGO, Aug. 24—Allied Products Corp. reports net loss for the first six months of 1931 of $77,221, after all charges including depreciation and including a net loss of $15,697 of the Indiana Lamp Division of the company, which was sold Feb. 1 to the Corcoran-Brown Lamp Co. The balance sheet as of June 30 shows current assets of $914,036 as compared with current liabilities of $48,854, or a ratio of 18.7 to 1. Cash amounted to more than five times the current liabilities. No comparison with a year ago is available.

Perfect Circle Profits

CHICAGO, Aug. 24—Perfect Circle Co. reports for the first seven months of 1931, record net profits after all deductions of $586,579, or $3.61 a share, on the 162,600 shares of common stock outstanding. This compares with net profit of $430,019, or $2.65 a share, for the first seven months of 1930. Earnings for each month have shown an improvement.

Moline Co. Making Free Wheeling Unit

MINNEAPOLIS, Aug. 24—The Minneapolis-Moline Power Equipment Co. has begun manufacture of free-wheeling transmission units for the Advance Motor Co., 69 13th Street, S., patentee. The company distributes units to retailers of low-priced cars whose manufacturers do not offer free wheeling as standard or optional.

Fokker Aircraft Changes Name

NEW YORK, Aug. 24—J. M. Schoonmaker, Jr., president, General Aviation Corp., has announced that the name of its wholly owned subsidiary, Fokker Aircraft Corp. of America, was changed to General Aviation Mfg. Corp.

Studebaker Holders Increase

SOUTH BEND, IND., Aug. 24—The Studebaker Corp. has now more stockholders than at any time in its history, according to an announcement from the general offices here. As of Aug. 10, there were 31,082 individual names recorded, compared with 29,348 on the corresponding date of 1930, and 20,051 in August of 1929.

S. A. E. Appoints Rating Committee

Action Follows Call For it at June 17 Meeting of Council

NEW YORK, Aug. 24—A joint committee to study rating with a view to bringing forth some generally acceptable method for motor truck and motor coach chassis has been selected by Vice-President F. K. Glynn, acting on behalf of the Transportation and Maintenance Activity, and Vice-President L. R. Buckendale, acting on behalf of the Motor Coach and Motor Truck Activity of the Society of Automotive Engineers.

The appointing of this committee is in accordance with S.A.E. Council action at the June 17 meeting, at which the forming of such a committee was unanimously approved.

Those who will serve on the committee are: L. Ray Buckendale, executive engineer, Timken-Detroit Axle Co.; B. B. Bachman, vice-president of engineering, the Autocar Co.; A. K. Brumbaugh, commercial engineer, White Motor Co.; H. W. Drake, superintendent of garage, Portland (Ore.) Gas & Coke Co.; F. K. Glynn, engineer, operation and maintenance of automotive and transportation department, Middle West Utilities Co.; A. G. Herreshoff, chief engineer, commercial car division, Dodge Bros. Corp.; M. C. Horine, sales promotion manager, International Motor Co.; Adrian Hughes, Jr., superintendent, bus transportation, United Railways & Electric Co. (Baltimore); A. S. McArthur, general superintendent, Toronto Transportation Commission; C. A. Peirce, vice-president, charge engineering and production, Diamond T Motor Car Co.; W. D. Reese, chief engineer, General Motors Truck Co.; A. W. Scarratt, chief engineer, motor trucks and coaches, International Harvester Co., and J. F. Winchester, superintendent of motor vehicles, Standard Oil Co. of New Jersey.

Marvel Business Increases

CHICAGO, Aug. 24—C. S. Davis, president of Borg-Warner Corp., states that business of the Marvel Carburetor Co., a division, during the second quarter of this year was slightly greater than in the preceding three-month period. The renewal of a contract with one of the leading automobile manufacturers was a factor in the increased business.

Morse Chain Has Increase

CHICAGO, Aug. 24—Sales of Morse Chain Co., a subsidiary of Borg-Warner Corp., for the second quarter of this year, showed an increase of 19 per cent over the first three months of the year, C. S. Davis, president of the parent corporation, announces.

Trucks Pay for Use Of Roads, is View

Traffic League Executive Says Railroads Fail to Prove Case

NEW YORK, Aug. 27—Motor trucks pay more for rights of way than railroads, and since the facts also show that highway carriers are adequately taxed for the construction and upkeep of roads, the shipping public will not take part in any program, based on "vague and indefinite charges," which will virtually destroy highway transporation, declared R. C. Fulbright, in a statement today answering charges that trucks are subsidized, made by Edward S. Jouett, vice-president and general counsel of the Louisville and Nashville Railroad.

Mr. Fulbright, who is chairman of a committee of the National Industrial Traffic League, which is exchanging views with railroad executives on their declaration of policy, contended "until railroads can show some concrete proof of their allegation that the governments are subsidizing the motor trucks the figures which indicate otherwise will most likely be accepted by the public as proof of the true situation."

Railroads were criticized by Mr. Fulbright for failure to heed shippers' pleas that the carriers adopt modern accounting systems which will enable them to determine the extent to which they may meet their competitors, and the extent to which the individual operations they engage in are profitable.

An analysis of truck transportation as its affects railroads reveals that the trucks compete mainly for less than carload traffic which is hauled unprofitably on rail tracks, he said. He added that this type of traffic, while accounting for only about three per cent of the total tonnage, involves the utilization of more than one-quarter of railroad equipment, and is responsible for approximately one-third of the claims that are paid in loss and damage on all traffic.

Statements to the effect that "unfair truck competition" threatens rail earnings and employment are exaggerated, according to the shipper representative, who declared that in 1929, the last normal year, trucks hauled only 2.5 per cent of the total internal commercial freight tonnage, excluding the intercoastal trade.

As his statement was a refutation of the Louisville and Nashville official's charge of truck subsidies, Mr. Fulbright stated "taking the average of the six states in which this road operates, the taxes paid by the motor truck for right of way alone would amount to 10.5 mills per net revenue ton-mile, or more than three times the cost to the Louisville and Nashville."

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Olympia Passenger Car Show, London .....Oct. 15-24
Olympia Truck Show, London..Nov. 5-14
Passenger Car Show, Glasgow..Nov. 13-21
Motorcycle Show, London..Nov. 30-Dec. 5

CONVENTIONS

S.A.E. Aeronautic Meeting (in conjunction with Natl. Air Races), Cleveland, Ohio .....Sept. 1-3
Eastern States Exposition, Springfield, Mass. .....Sept. 20-26
American Welding Society, Boston, Mass. .....Sept. 21-25
American Electric Railway Assn., Atlantic City, N. J.....Sept. 26-Oct. 2
S.A.E. National Production Meeting, Detroit .....Oct. 7-8
National Safety Council, Chicago, Ill. .....Oct. 12-16
Society Industrial Engineers, Pittsburgh, Pa. .....Oct. 14-16
Transportation Meeting, S.A.E., Washington, D. C. .....Oct. 27-29
American Chemical Society, Buffalo, Aug. 31-Sept. 4
American Society Mechanical Engineers (General Meeting), Kansas City .....Sept. 7-9
W. Va. Motor Transportation Assn., Charleston .....Sept. 11
Society for Elec. Development, New York City .....Sept. 11
Steel Founders Society, Chicago..Sept. 17
American Institute Mining and Metallurgical Engineers—Iron and Steel Division, Boston .....Sept. 21-24
American Society for Steel Treating (National Metal Exposition), Boston .....Sept. 21-25
American Society Mechanical Engineers—Machine Shop Practice, Boston .....Sept. 21-26
American Gear Mfg. Assn., Pittsburgh .....Oct. 15-17
National Hardware Assn., Chicago, Oct. 19-22
American Iron and Steel Institute, New York City .....Oct. 23
American Railway Assn.—Motor Transport Division, Chicago.....Oct. 27-28
American Society Mechanical Engineers—Annual meeting, New York City .....Nov. 30-Dec. 4
American Roadbuilders Association, Detroit, Mich. .....Jan. 11-14, 1932

Otis K. Richards

DETROIT, Aug. 27—Otis K. Richards, vice-president of the Allied Products Corp., died at the University Hospital, Ann Arbor, early Monday, Aug. 24, of injuries incurred when the car he was driving went into a ditch three miles west of Clinton, Mich. His wife and a nephew, Bernard Richards, who were with him at the time, also were injured.

Mr. Richards, who was 44 years of age, has lived in Detroit for many years. He and his brother, C. C. Richards, started a small machine shop several years ago; their business grew to such proportions that it was finally merged with the Allied Products Corp. Otis K. Richards was a member of Detroit Lodge No. 2, A. F. & A. M., the Moslem Shrine and the Detroit Yacht Club.

Diamond T Offers New Two Tonner

Priced at $1,095, It Offers Advances Over Previous Type

CHICAGO, Aug. 27—A new 2-ton truck, listed at a price of $1,095, has been announced by Diamond T Motor Car Co. This new unit, designated as Model 316, and replacing Model 291, besides being $300 less in price than the former model, represents a decided advance in design, has a larger engine, stronger frame, heavier springs, and a lighter chassis weight. Three wheelbases are furnished—155 in., standard; 167 in., special long, and 137 in., for dump bodies and tractor service.

The rubber-mounted engine is a six-cylinder, 3⅝ x 4¼ in., Diamond T Hercules JXB, displacing 263 cu. in., and developing 65 hp. at 2400 r.p.m. It is mounted in unit with a Borg & Beck dry-plate clutch and four-speed Warner-Gear transmission. Spicer universal joints and two-piece propeller shafts with self-adjusting SKF ball-bearing support are employed.

Fuel is fed by a camshaft-driven fuel pump to a 1¼-in. heavy-duty Zenith carburetor of the down-draft type, equipped with air cleaner. The radiator, heavy-duty type, has flat tube and fin core fitted in a pressed steel shell finished in chromium plate. The core is further protected by a guard of chromium-plated bars. Starting, lighting and ignition are furnished by Auto-Lite.

Final drive is through a Clark B613 full-floating spiral bevel rear axle. The pinion is rigidly straddle mounted on three rows of bearings. Service brakes are four-wheel Lockheed hydraulics, equipped with special molded lining, having a total area of 350 sq. in. Front drums are 16 x 2¼ in., and rear 16 x 3½. Rear drums are cast of alloy iron.

Cam and lever Ross steering is employed, with extra long front springs (42 x 2½ in.) carried in compression-type rubber bushings, and shackled in front. Rear springs are 53 x 2½ in., and have six-leaf helper springs. The tapering pressed steel frame includes special cross members of the alligator-jaw type. Depth is 7 in. at point of greatest stress, the flange is 3 in., and the stock 7/32 in.

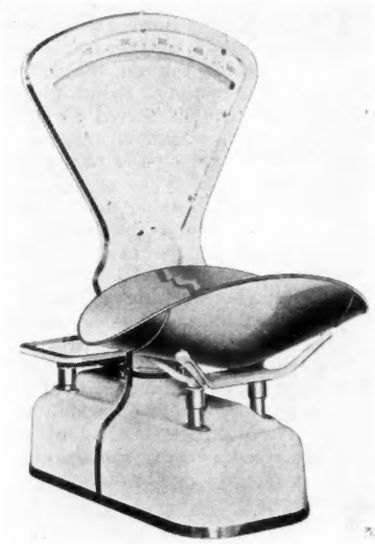
Hollow-spoke metal wheels are standard equipment, and tires are 6.50/20 balloons with dual rears. Equipment includes electric lights, speedometer, heat indicator and spare rim and tire carrier. A special de luxe all-weather steel cab, specially designed for this model, is also offered. Seat cushions are deep, a rubber mat is provided for floor, and accelerator pedal is comfortably placed. Cowl and cab treatment have been worked out to provide harmonious stream-like appearance.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Toledo Laboratory Scale

A laboratory scale, designed to permit close reading without the use of extended beam equipment, has been perfected by the Toledo Scale Co., Toledo, Ohio. The chart on this scale



has a capacity of 500 grams, with a mark and figure for each gram. It also shows the avoirdupois equivalents. Additional capacity up to 5 kg. may be secured by the use of weights. This scale is said to be so designed that the oscillation ordinarily found in extended beam type scales is eliminated.

This scale is for use, primarily, in industrial research laboratories. It is also an aid to research engineers, as it is said to enable them to weigh ingredients accurately, to the gram, in approximately one-quarter the time consumed with balance equipment.

B & S No. 4 Geared Pump

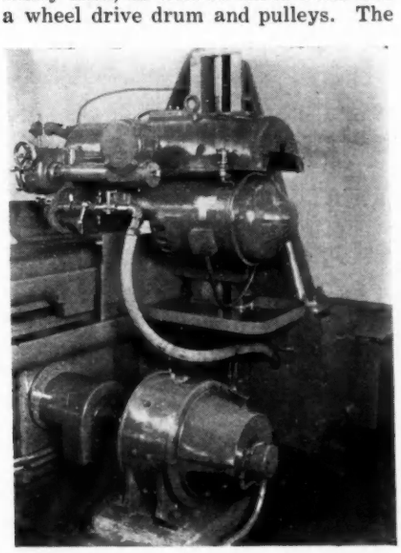
The Brown & Sharpe Mfg. Co., Providence, R. I., has added the No. 4 pump of larger capacity than the Nos. 1, 2 and 3 geared pumps in their regular line. This pump has a capacity of 15 g.p.m. at 500 r.p.m. with a corresponding increase in discharge of 3 g.p.m. for each 100 r.p.m. increase up to a maximum of 30 g.p.m. at 1000 r.p.m. Suction and discharge ports of 1¼ in. pipe size provide for the most favorable handling of this volume of liquid.

The No. 4 pump is of the same design and construction as the other pumps made by this manufacturer. It is particularly adaptable as a coolant pump for machine tools. For larger machinery it makes a very efficient lubricating pump.

Open Side Surface Grinder

An improved model of the large 15 x 15 in. open-side surface grinding machine has been brought out by the Norton Co., Worcester, Mass. The principal feature of the new model is the design of the wheel slide. The rear portion of the slide is cylindrical in shape and bored to receive a standard motor field, which is pressed into place. The wheel spindle carries a standard rotor which runs in the stator with proper clearance. The rating of the spindle motor is 15 hp. at 1200 r.p.m. constant speed. The unit is air cooled by circulation from a fan mounted on the rear end of the spindle.

This arrangement eliminates the spindle pulley and countershaft formerly used, as well as three belts and a wheel drive drum and pulleys. The



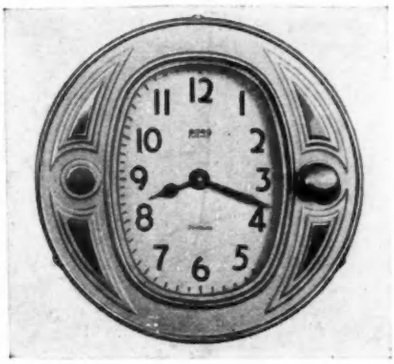
spindle and rotor unit is carefully balanced and runs with absolutely no vibration. About three times as much power is transmitted to the grinding wheel as was possible with the old drive.

Other improvements in the machine include a new 30/1 double worm reduction gear for the table drive, and the installation of a motor-driven "Fulflo" pump unit for the grinding lubricant.

The machine mounts a 14 x 6 x 5 in. grinding wheel and will be built in three lengths, 6 ft, 8 ft., and 10 ft.

Borg Automobile Clock Illuminated

A new electric clock for automobiles has been placed on the market by the Geo. W. Borg Corp., Chicago. This clock has an illuminated



dial, is self-winding, and uses current from the car battery.

This electric automobile clock has a jeweled balance staff, machine-cut pinions, vernier regulator and a safety fuse. The hairspring is of the type which compensates for temperature changes and the general construction of the clock is exceptionally sturdy, to withstand the jolts and jars given it by the average automobile or truck.

The clock has a black enamel, dustproof case, trimmed in chromium highlight. A steering post bracket of polished chromium is regularly furnished. The clock also can be installed on the instrument board by using a special bracket.

The dial illumination is provided by an electric bulb within the movement, which casts a soft glow over the face and permits easy reading in the dark. A switch at the front allows either momentary or continuous lighting of the dial.

New Babbitt Metal

A new babbitt metal has been placed on the market by the Bunting Brass & Bronze Co., Toledo, Ohio. It is a lead-base product packaged in a wooden box containing 10 5-lb. bars. The bars are cast in such form as to be readily divisible into smaller portions. The product is offered for all operations served by a lead-base babbitt.

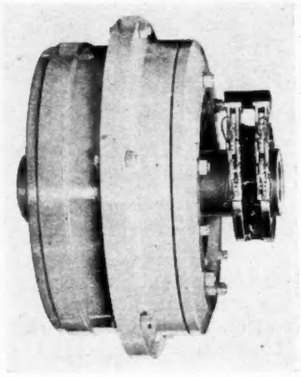
(Turn to page 338, please)

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Multiple Disc Magnetic Clutch

An improved multiple disk magnetic clutch with many special features is offered by the Magnetic Mfg. Co., Milwaukee, Wis. The chief claim for this clutch is simplicity and elimination of moving parts. The friction lining is practically the only wearing surface. Other advantages are: Reduced size, less space required for installation; small diameter clutches take care of heavy loads; greater friction area; low cost—both for installation and maintenance.



Carboloy Tipped Inserted Blade Milling Cutters

After considerable research and development work, the Continental Tool Division of the Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich., has developed a new type of milling cutter, equally adaptable for the use of high-speed steel, Stellite or tungsten carbide blades. This cutter will be known as the Type R. C. Roughing and Finishing Milling Cutter, when used with Carboloy tipped blades and Type R. when used with high-speed steel or Stellite blades.

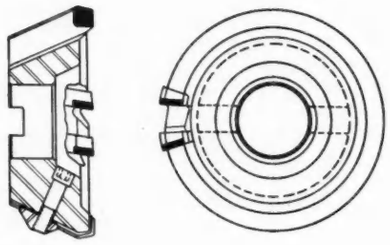
In designing the cutter body, greater strength is obtained through correct design, which insures maximum rigidity of cutter during the milling operation. The cutter body is hardened and ground which insures longer operating life. The life of the cutter will not be affected by wear in the slots as this is taken up by the taper on the blades.

The blades for this cutter are the wedge type. These blades are anchored securely by means of a holding clamp—each clamp anchoring two blades in position. By using the wedge type of blade and slot construction, blades can be securely anchored, thereby making the cutter as strong as if it were made from one piece.

Adjustment of blades and elimination of vibration are two outstanding features of this type of cutter. An individual horizontal adjustment can be made on each blade to compensate for wear or breakage. Adjustment to the correct overhang is very important when using Ex-Cell-O Carboloy or any tungsten cutting blade.

Correct backing is provided for each blade, and pressure exerted by the holding clamp is so distributed that it will not injure Stellite when used for the cutting blades.

The new cutters are available from



5 in. diameter up to 24 in. diameter and larger. The number of teeth per cutter is determined by the material to be milled, type of cut to be made, and type of duty the customer requires. These cutters are adaptable to the various types of drives required.

Natco Multiple Driller and Tapper

A new Natco "Multiple," the Model D-5 has been announced by the National Automatic Tool Co., Richmond, Ind. It is designed as a universal machine with a wide range of adjustments enabling it to handle work of varying sizes. It is built as a driller only, as a tapper only, or as a combination driller and tapper. The most economical tool speeds are secured through the use of spindle speed change gears. It has a capacity of 10¼ in. drills and 10 3/16 taps in mild steel.

The head has a drilling area of 5½ x 10 in. and is built to receive 10 spindles. Provisions have been made to omit any that are not needed. The spindles are held in place by an adjustable arm which is bolted to the underside of the head flange. A vertical adjustment of 1¼ in. is provided on all spindles (a new feature on machines of this class) to compensate for drill grinding.

The new Natco spring collet, made of oil tempered spring collet steel, is bored for the specific drill or tap of the size to be used. It has a three-point clamping action which centralizes the tool properly. Larger collets are provided with a broached square to drive the tool, a method much superior to the old pin drive.

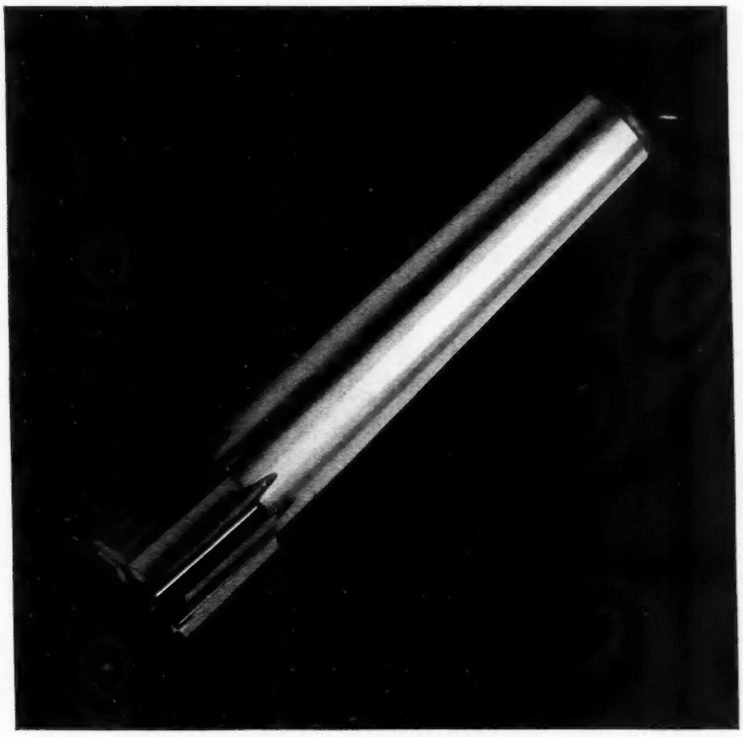
The "arm-type" limit switch controls the point of tap reversals and insures exact depths on blind hole tapping. It is mounted on an adjustable arm and can be moved about to locate the trip mechanism as close as possible to the tap, on the part being tapped.

A special ball-bearing motor was designed to withstand the severe reversal load without overheating. The 1-hp. motor is capable of 50 reversals or 25 complete working cycles per minute. The 2 hp. motor is capable of 30 reversals or 15 complete working cycles per minute.

Feed is applied through a float-operated lever to a table on which the work is placed. This method of applying the feed permits the operator to use his hands freely in handling the work thus resulting in a high operator efficiency. When desired, a hand operated lever can be used to replace the foot lever.

(Turn to page 340, please)

BARBER-COLMAN



ACCURATE TO A "TENTH"

Few tools are more accurately made than Barber-Colman Jig-Boring Reamers. Their precision is measurable in tenths of thousandths of an inch. Naturally, they excel for extremely close work . . . Made from one piece of high speed steel, their shanks are finish ground between lapped centers to eliminate run-out. Cutting edges are sharpened on the Barber-Colman Reamer Sharpening Machine, explaining the accuracy possible on the diameters of these reamers. A deep counterbore permits of many resharpenings on the end teeth. . . . We carry these reamers in stock in a wide range of sizes. When ordering, be sure to specify exact size in tenths of thousandths of an inch.

BARBER B-C COLMAN

BARBER-COLMAN COMPANY

General Offices and Plant

ROCKFORD, ILLINOIS, U. S. A.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Ferner Comparator for Checking Steel Balls

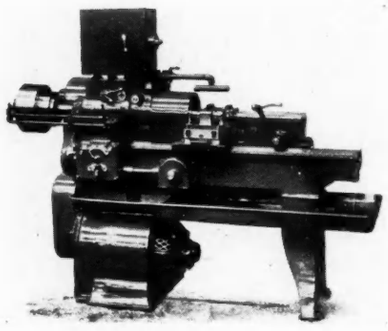
A Micro-Indicator stand designed especially for checking the diameter and roundness of steel balls has been placed on the market in the United States and Canada by the Société Genevoise d'Instruments de Physique of Geneva, Switzerland, through their American agents, The R. Y. Ferner Co., Investment Bldg., Washington, D. C.

In this use of the stand a small pin is inserted under the front edge of the base to hold the stand in a slightly tilted position and a Vee block is used as a lower table of the apparatus. The balls to be tested are allowed to roll down this Vee groove to an adjustable stop. The Micro-Indicator used for these measurements, is provided with a lifting clip by which the contact plunger can be raised to allow the ball to take its proper position. The plunger then can be lowered for the measurement. The Micro-Indicator is provided with adjustable tolerance marks which can be set at any point over a range of 0.003 in. either side of the center.

When it is seen, by the reading of the Micro-Indicator, whether the ball in position is within or without the tolerance, a lever can be thrown to the right or left to eject the ball to one or the other of two tubular troughs leading to receptacles for accepted and rejected balls. Since the balls are thrown out at the rear of the Vee groove it is possible to carry on inspection of the balls very rapidly, practically as fast as they can be fed in at the front of the apparatus. The Micro-Indicators used for this work have a knife-edge multiplication system of high accuracy and can be obtained graduated to as fine a reading as one twenty thousandths of an inch per division. The stand has capacity for balls between ⅛ and ⅝ in. in diameter.

LeBlond Automatic Lathe

According to a recent announcement, an automatic lathe for rough and finish facing or rough and finish forming has been placed on the market by the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. It is suitable for a wide variety of parts such as: Gear shift levers, piston grooving, ball joints, etc. It is so constructed that precision facing and forming work can be produced at a maximum



rate with a minimum of effort. The machine shown in the illustration is tooled for rough and finish forming the ball joints on the lower end of an automobile transmission shifter lever.

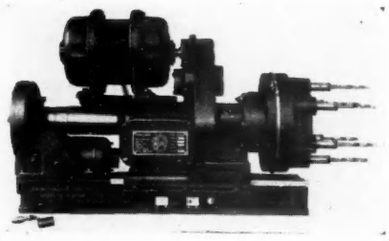
Although the feed mechanism for this machine is simple, it is so constructed that a wide variation of feeds may be instantly obtained by merely shifting the feed change levers. The reduction ratio from the feed shaft to the cam drum is ten to one, thus giving a powerful drive free from torsional vibration under heavy cuts.

The machine is entirely automatic in its cycle of operations, the only duties of the operator being to load, unload and press the spindle start lever. The tool slide is automatically traversed to the cutting position for the rough forming tools. The rough forming cut is then taken at a suitable feed and the tool slide is traversed to the cutting position for the finish form tools. At this point a cam mounted on the end of the cam drum actuates a switch which shunts out part of the resistance in the shunt field circuit of the driving motor, and thus reduces the spindle speed of the machine. The machine then feeds to the cutting position and takes a very light finish forming cut at a very reduced cutting speed. When the cut is complete another cam causes the shunt across the resistance in the shunt field circuit to be cut out and the spindle speed returns to the normal rate.

This machine has a six speed Timken equipped geared head and spindle speeds up to 1000 r.p.m. may be obtained.

Center Feed Drill Unit

The Baush Machine Tool Co., Springfield, Mass., have recently added to their line of fixed and adjustable center multiple spindle drilling machines a new drilling unit which will be furnished in various sizes, the one illustrated being known as the No. 3 and having a capacity of one 1½ in. drill or six ⅝ in. drills, or equivalent, in cast iron. The features of this unit are: Compactness, center feed, and all-electric machine operation. The head is provided with a quick forward motion, a positive, uniform, powerful center feed and a quick return to starting position. These movements are automatic and yet under complete control of the operator by means of a 4-push button station which may be used to stop, start, inch forward or backward, or reverse head travel in either direction at any time. This unit, like other drilling units, may be mounted singly or multiplely in horizontal or vertical positions for various complicated operations of drilling, reaming, spotfacing or boring. It can be arranged



for tapping at a slight additional cost.

Referring to the illustration, 3 hp. motor drives through spur gearing the main spindle, which can operate a single drill or any of the standard multiple drilling heads. The drilling speed is changed by changing the gears. Feed is changed by changing the pick-off gears.

(Turn to page 342, please)

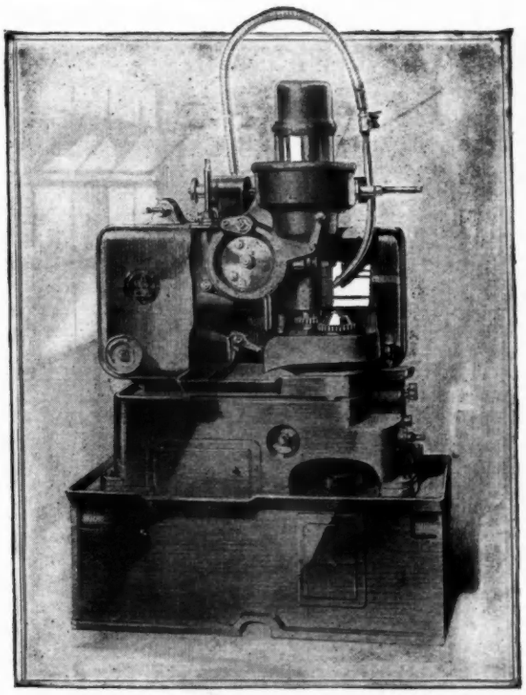
CONSIDER
The Effect of FINISH
On QUIETING GEAR OPERATION

Any good gear production man will tell you that gears are only as good as the finish —and the finish only as good as the cutter and the method of producing it.

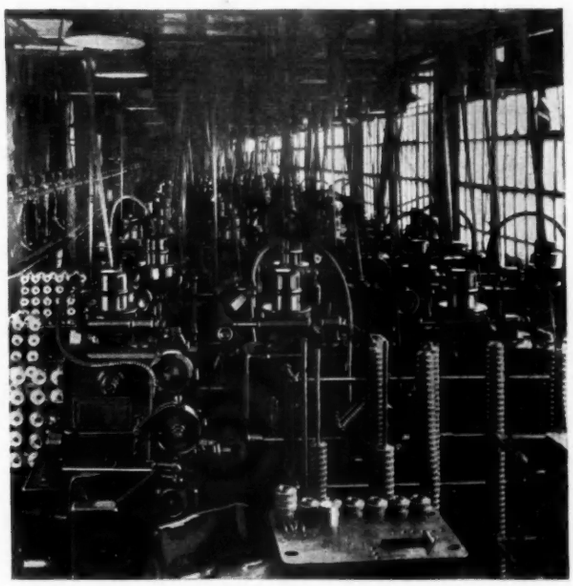
Accurate gear teeth, with a smooth finish on the involute contacting profiles, are more quiet in operation and last longer than less perfect gears. They cost less, because there are fewer rejected assemblies. "Original Fellows" Cutters, because they are uniformly of laboratory precision quality, are longer-lived, cut more gears per grind and minimize production losses incident to changing cutters. They cost less in the final accounting.

Automobile owners are coming to be gear noise conscious, why not ask one of our representatives to give you the latest facts on what is being done to reduce gear noises. It wont cost you anything and may assist to lift your product out of the competitive class.

THE FELLOWS GEAR SHAPER CO.
78 River Street, Springfield, Vt.
616 Fisher Bldg., Detroit, Mich.



The High Speed Gear Shaper and Original Fellows Cutters are the one sure way of producing uniformly good gears.



"We would not think of using anything but Fellows Gear Shapers," sa'd the production manager of this plant. Here are 93 machines in one battery

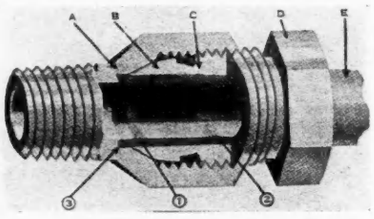
FELLOWS
GEAR SHAPERS

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Dole Universal All-Tube Coupling

A coupling which will fit all tubes, whether seamed or seamless, of steel, aluminum, brass or copper, has been brought out by the Dole Valve Co. of Chicago. It is of the two-piece type and requires no soldering or flaring. As the coupling compresses, the small end of the threaded sleeve screw presses onto the tubing wall, thus filling the seams in the seamed tubing. The ball part of the threaded sleeve screw presses against the funnel-shaped inside wall of the coupling body, forming a ball joint or seat. The sleeve and the compression screw are united with solder which breaks during compression, leaving the sleeve permanently on the tubing and providing a lead-lubricated bearing for the compression screw. As the compression screw continues to be tightened, the end of the tubing is forced against the V shoulder in the coupling body, completing another independent joint. Another compression on the tubing is made at the point of the bearing of the compression screw on the sleeve, this causing the small tapered end of the sleeve to turn up against the inner wall of the compression screw, locking it against accidental separation. It is claimed that the coupling can be connected repeatedly without losing its efficiency.



Dole Universal Coupling in Section
A, body; B, sleeve; C, solder bearing; D, nut; E, seamed tubing; 1, 2, 3, first, second and third compressions

Cleveland 5-Ton Tramrail

A five-ton electric Tramrail has been added by the Cleveland Electric Tramrail (division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio). The five-ton or 5100 Type Tramrail is (like the 2100 type) based on a rail section having the raised tread, designed and rolled specially for the purpose; this special rail section is then electrically welded to half of a section of Bethlehem I-beam, the whole beam having been halved by punch press lengthwise through the web—the completed rail forming a patented design known as Arch Beam.

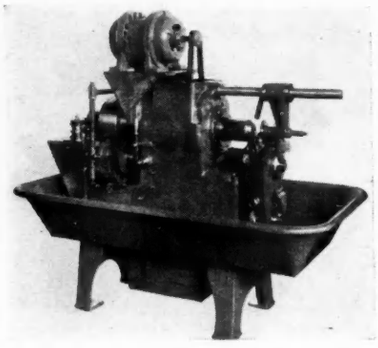
The Tramrail principle of flexible rail suspension, long wheel base carriers with swivel yokes and double-row ball-bearing wheels, underslung-type cranes with swivel-end trucks, and other details and principles peculiar to Cleveland Tramrail are used throughout.

Rickert-Shafer Cutting-off Machine

Cutting off pipe nipples, rods, tubing, etc., is said to be accomplished with facility on the cutting-off machine recently added by the Rickert-Shafer Co., Erie, Pa.

In the design of this machine, tool holders are mounted on oscillating arms, which are controlled by adjustable cams, thereby giving any length of cut and feed. For cutting pipe nipples a 'V" forming tool makes the preliminary cut, after which the roller cutter, mounted on the opposite side, completes the operation. This produces the chamfer on the end of the nipple. Using the roller, instead of a parting tool produces a saving of metal, which is of importance where large quantities of pipe are cut up in a day's run.

The forming tool, being mounted tangentially in relation to the work, produces a "flow chip" so essential for the free cutting action. This feature, combined with the cam-controlled

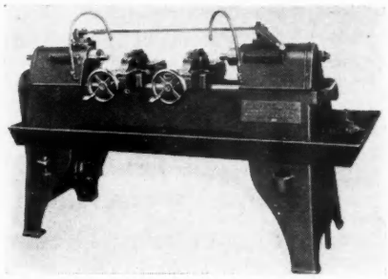


method of feeding, and the rigid mounting of the oscillating arm is said to eliminate chatter, thereby adding to the life of the tool as well as to the quality of the work produced. On this machine the "work" revolves, being fed through the hollow spindle by the feed rolls on the back end. These feed rolls are so driven and controlled that they are in contact with the "work," for but a fraction of a second. As soon as the work strikes the stop and is gripped by the chuck, the rolls are pushed back by means of an automatically controlled sliding wedge.

A three-pawed, push-in collet is employed for gripping the pipe, the draw-in rod being actuated in its movements by the revolving air cylinder mounted on the rear of the spindle. The jaws are interchangeable for various diameters. To avoid "heating" which frequently occurs where revolving air cylinders are employed, the cutting oil or compound, which is used for the tools, passes through a jacket surrounding the air port housing on the cylinder. The operation of the air cylinder is controlled by cam-operated valves, the cams being adjustable for accurate timing.

Double-End Drilling and Centering Machine

To meet the demand for a substantial, powerful and rigid centering equipment, the Sundstrand Machine Tool Co., Rockford, Ill., has placed on the market the No. 56 D.E. Drilling and Centering Machine. It is more than a centering machine, as reaming,



spot facing and tapping operations can be performed equally as efficiently, especially where two ends of a part can be machined simultaneously. The right-hand head and both vises are adjustable longitudinally along the bed. Spindles can be operated simultaneously or independently. Vises can be operated independently by means of hand wheels, or by special arrangement both vises may be operated in unison through one hand wheel. Pneumatically operated vises can be furnished if desired.

The motor is mounted in the left-hand leg of the machine and Vee-belt drive is regularly furnished. Suitable provisions are provided for belt takeup, and guards are supplied as 900 to 1800 r.p.m. motors are recommended. A combination of four quick regular equipment. One to five hp., change speeds ranging from 85 to 1800 r.p.m. can be provided by the adoption of a Westinghouse Wise Multi-speed Drive.

Capacity: Two one-in. drills in steel. Work diameter, 6 in., either round or hexagonal. Length, up to 72 in., depending upon size of machine.